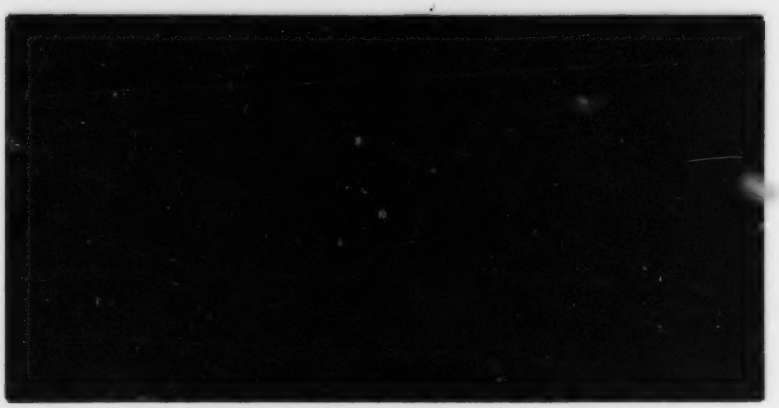
REPORT 11



SWEEP

SOIL AND WATER

ENVIRONMENTAL

ENHANCEMENT PROGRAM

PAMPA

PROGRAMME D'AMELIORATION

DU MILIEU PEDOLOGIQUE

ET AQUATIQUE

Canada

Ontario

SWEEP

is a $30 million federal-provincial agreement, announced May 8, 1986, designed to improve soil and water quality in southwestern Ontario over the next five years.

PURPOSES

There are two interrelated purposes to the program; first, to reduce phosphorus loadings in the Lake Erie basin from cropland run-off; and second, to improve the productivity of southwestern Ontario agriculture by reducing or arresting soil erosion that contributes to water pollution.

BACKGROUND

The Canada-U.S. Great Lakes Water Quality Agreement called for phosphorus reductions in the Lake Erie basin of 2000 tonnes per year. SWEEP is part of the Canadian agreement, calling for reductions of 300 tonnes per year — 200 from croplands and 100 from industrial and municipal sources.

PAMPA

est une entente fédérale-provinciale de 30 millions de dollars, annoncée le 8 mai 1986, et destinée à améliorer la qualité du sol et de l'eau dans le Sud-ouest de l'Ontario.

SES BUTS

Les deux buts de PAMPA sont: en premier lieu de réduire de 200 tonnes par an d'ici 1990 le déversement dans le lac Erie de phosphore provenant des terres agricoles, et de maintenir ou d'accroître la productivité agricole du Sud-ouest de l'Ontario, en réduisant ou en empêchant l'érosion et la dégradation du sol.

SES GRANDES LIGNES

L'entente entre le Canada et les États-Unis sur la qualité de l'eau des Grands Lacs prévoyait de réduire de 2 000 tonnes par an la pollution due au phosphore dans le bassin du lac Erie. PAMPA fait partie de cette entente qui réduira cette pollution de 300 tonnes par an — 200 tonnes provenant des terres agricoles et 100 tonnes provenant de sources industrielles et municipales.

AN ECONOMIC EVALUATION

OF

TILLAGE 2000 DEMONSTRATION PLOT DATA

(1986-1989)

Prepared by:

Deloitte & Touche

as part of:

THE FARM LEVEL

ECONOMIC ANALYSIS COMPONENT

OF THE

SOIL & WATER ENVIRONMENTAL

ENHANCEMENT PROGRAM (SWEEP)

Funded By:

Agriculture Canada

Aug. '90

Deloitte & Touche

EXECUTIVE SUMMARY

Deloitte & Touche undertook an evaluation of the costs and returns associated with a range of conventional and conservational tillage practices incorporated in the Tillage 2000 program.

The analysis incorporated results from 1986 to 1989 for corn, soybeans, wheat and spring grains, on sandy, loamy, fine, silty and clay textured soils. Tillage 2000 has demonstrated a strong relationship between soil texture and the ease of adopting a conservation tillage system. Any analysis of the data should consider the effect that soil texture has on the success of conservation tillage systems. A detailed analysis of Tillage 2000 is available in the Tillage 2000 1989 Progress Report.

Key findings are that:

1. No till and reduced tillage practices incorporated in the Tillage 2000 program are competitive with conventional tillage practices in corn and winter wheat.

2. No till and reduced tillage practices incorporated in the T-2000 trials were less competitive than conventional practices in soybeans and spring grains.

3. No till provides producers with realistic potential for significant labour savings and equipment cost savings when used in corn. Moreover, no till cropping operations would be more viable on farms with high opportunity costs to labour.

Specifically, farms with high opportunity costs to labour include the following examples:

a) labour shortage or difficulties at key work times;
b) higher returns to labour inputs in other enterprises, eg. dairy; and
c) high returns from expanding the crop enterprise or the total farming enterprise.

Summary of Yield and Financial Returns to Alternative Tillage Practices for Specific Analysis and Crop Situtations

Crop & Analysis Situation	Yield bu/acre	Material[1] Costs $/acre	Gross Margin $/acre	Net Returns $/acre	Net Returns to Labour $ net returns/ labour hour
Corn 1986-1989 (aggregate data)					
Conventional	122	107	288	162	119
Reduced	117	110	271	155	147
No Till	118	115	269	169	220
Corn 1986-1989 (paired comparisons)					
Reduced vs. Conventional	-3	+1	-13	-4	+8
No Till vs. Conventional	-3	+7	-16	+6	+62
No Till vs. Reduced	+2	+8	-14	+5	+71
Soybeans 1986-1989 (aggregate)					
Conventional	40	72	213	132	109
Reduced	37	75	187	114	100
No Till	33	96	142	80	98
Spring Grains 1986-1989 (aggregate)					
Conventional	50	56	78	17	12
Reduced	48	59	71	6	4
No Till	26	78	-7	-56	-68
Winter Wheat (aggregate)					
Conventional	57	88	127	73	64
Reduced	59	92	133	81	84
No Till	54	102	102	52	79

[1] Seed, Fertilizer, Herbicide & Insecticide Costs

ACKNOWLEDGEMENTS

Deloitte & Touche would like to express their appreciation to OMAF and to Doug Aspinall in particular for providing the necessary data for the research. We would also like to acknowledge the funding provided by Agriculture Canada as part of the ongoing SWEEP project and the support and input from Rick Seguin.

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1.0 INTRODUCTION

The Ontario Ministry of Agriculture and Food (OMAF), the University of Guelph, and the Ontario Soil and Crop Improvement Association have worked in a cooperative effort to develop a variety of soil conservation tillage practices on selected farms in southwestern Ontario, from 1986 to 1989. This program, commonly referred to as Tillage 2000, is part of SWEEP. Detailed data on both inputs and outputs has been compiled for four years on a field and cooperator basis. The nature and type of data collected conforms closely to the data that will be collected in the SWEEP-PDW program. This compiled data was made available to Deloitte & Touche for the fulfillment of two objectives:

1. To test the data management system and economic evaluation models developed by Deloitte & Touche for the farm level economic impact assessment of alternative soil conservation practices.

2. To provide stakeholders with preliminary economic evaluation results of Tillage 2000 in a manner that will be consistent with the results to be generated for the rest of the SWEEP program.

Deloitte & Touche undertook an initial analysis of the 1986 to 1988 Tillage 2000 data in 1989[2]. This subsequent analysis incorporates an additional years data and some refinements by OMAF to the overall data base and the definitions associated with No Till and Reduced Tillage practices (see Section 2.0). Consequently, the results from last years report cannot be directly compared to this year's results and this report therefore, represents a new and not updated analysis of the results.

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[2] See "An Economic Evaluation of Tillage 2000 Demonstration Plot Data (1986-1988)".

2.0 TILLAGE 2000 DATA BASE

The Tillage 2000 data provided to Deloitte & Touche represents 33 producers over four years and across 7 crops, including the following:

corn
soybeans
canola
wheat
spring grains
winter barley

Sufficient data for a meaningful economic analysis was available for only four of the above crops, namely: corn, soybeans, wheat, and spring grains. Information for all other crops was processed into the data management system to test the full data management capabilities of the program, and is available upon request.

A variety of tillage classifications/practices are reported for each field. Upon consultation with OMAF personnel, it was decided to classify all tillage practices into one of three categories, thus making the economic evaluation and comparison of alternative practices more manageable and meaningful for interpretation. The three tillage practice classifications used in this analysis are:

1) CONVENTIONAL TILLAGE: - utilizing fall and/or spring ploughing operations with traditional mouldboard ploughs, which attempt to completely overturn the soil and leave little crop residue (e.g. mouldboard ploughing).

2) REDUCED TILLAGE: - utilizing tillage operations with equipment that only partially overturns the soil and leaves greater amount of crop residue compared to conventional tillage (e.g. soil saving).

3) NO-TILL: - utilizing tillage systems with equipment where there is no incorporation or overturning of crop residue by primary tillage, thus leaving the greatest amount of crop residue (e.g. ridge tillage, no-till, and other non powered strip tillage).

Data was initially provided to Deloitte & Touche by Doug Aspinall of OMAF. The Tillage 2000 data is based on "paired" comparisons. That is, side-by-side demonstration comparisons were performed consisting of various combinations of conventional vs. reduced tillage, conventional vs. no-till, no-till vs. reduced tillage, or a combination of the three.

From an economic analysis perspective, the Tillage 2000 data (1986-89) can be organized two ways, as follows:

1) maintain the "paired" observations, and for each tillage practice combination include only those fields which fall under each category for each year. For example, if comparing the results of conventional vs. reduced tillage, only the conventional fields for which a matching/corresponding reduced tillage field is present are included in the average calculation and vice versa. The same would hold true for all other paired comparisons.

2) aggregate all field data into either conventional, reduced or no-tillage practices and 'conduct the economic analysis across all fields by category regardless of the existence of "paired" comparisons.

There are advantages and disadvantages of each approach. The paired analysis approach is more useful from a research perspective in that a more accurate estimate of the difference in each paired site specific comparison is provided. However, it is less accurate to directly compare results of conventional, reduced and no-till in a three-way comparison. Specifically, this first approach permits one to answer the following questions:

1. How do reduced tillage practices compare to conventional tillage practices?
2. How do no-till practices compare to conventional tillage practices?
3. How do no-till and reduced tillage practices compare?

By utilizing the second approach, (i.e. aggregate all crop data into three tillage practices for 1986-88), one can address the following questions more appropriately:

4. On average, what can a farmer expect in net returns from no-till practices compared to either reduced or conventional tillage practices, or vice versa?
5. What is the range of variability and potential financial risk associated each tillage practice, if all field results are taken into account?

The disadvantage of the aggregate approach is that more variability in responses is introduced due to differences in soil types and other locational differences. Nevertheless, it is likely that farmers would be more interested in answers to questions 4 and 5 above. Moreover presentation in this format provides a broader range and more conservative set of results perhaps more typical of the range of outcomes to be achieved by prospective users of the various tillage practices.

All Tillage 2000 input/output data sheets were reviewed by J.D. Aspinall, coordinator of Tillage 2000, to ensure proper interpretation and to review and update missing data files. Deloitte & Touche did not attempt to verify the accuracy of the reported data, rather to ensure that data files were complete.

The results are presented in aggregate format with paired results for corn.

3.0 DATA INPUT AND MANAGEMENT

The data management system designed by Deloitte & Touche to coordinate and manipulate large volumes of field level information from SWEEP was utilized for this task. This data management system was generated with DBASE III[3]. All field level information from Tillage 2000 was coded and key-punched manually into computer files. The following data files were constructed upon completion of this exercise:

1) General farm information - including farmer name-code, crops grown, acreage, and location.

2) Machinery inventory - including farmer name-code, machine brand and model, horsepower where relevant, fuel type, age of machine, purchase price, year purchased, unit width if relevant, average annual use, and expected life.

3) Operations performed - by date, kind of operation, type of labour used, time required to complete operation, and amount of fuel used.

4) Machines used by operation - listing of machinery use by operation as a basis to determine operation costs.

5) Material inventory - description of type and quantity of material used per operation by field.

The above data files can be printed in report format as requested.

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[3] The file structures and their descriptions are provided in the second annual SWEEP report (April 1988).

4.0 DATA CALCULATIONS/MANIPULATIONS WITHIN DBASE III

Within the data management system, several calculations were made based upon the imputed data. The first calculations were tractor and machinery costs per hour. These calculations were dependent on a series of previous calculations including: depreciation, interest, insurance and housing, and repairs and maintenance. All calculations were based upon the guidelines outlined in "Cost of Owning and Operating Farm Machines", OMAF Agdex 825, June 1984.

The data used for these calculations were:

- purchase price, as provided by Tillage 2000 cooperators;
- age or year when purchased;
- interest rate of 12%; and
- estimated total annual hours of use for all farm operations

An alternative to "purchase price" for all tractors and machinery was utilized, namely: "current market value" or "trade-in value", in a second machinery cost calculation. This was done for two reasons. First, there was a wide variation in the type/cost and age of equipment used by cooperating farmers in Tillage 2000.

This resulted in significant variation in machinery costs per acre as reported in previous OMAF publications of Tillage 2000 economic analysis results. Specifically, a farmer using a relatively old complement of farm machinery could obtain different net return results from various tillage practices compared to another farmer with a new machinery complement, simply based upon the cost of conducting the same operations. Consequently, an alternative method was required to account for these differences in machinery complements between farmers. For example, older equipment was valued at current market values using the Official Guide of current market values for tractors and machinery published by the Retail Farm Equipment Dealers Association. These new current market values were used in place of purchase price and assumed to be in year 1 of use, hence depreciation costs were determined in all cases. A similar process was conducted for newer equipment. This

resulted in a narrowing of the cost spread between new and older machinery complements[4].

Secondly, we believe that using current market values for machinery provides a better approximation of the "opportunity cost" of performing the operations. In this sense, it provides a more realistic cost comparison and decision making framework for farmers to consider. The impact of this alternative approach was to lower the machinery cost component somewhat and narrow the range of cost variability between farms.

Other data calculations conducted within DBASE III were:

- sum of fuel use by operation;
- sum of hours to complete each operation; and
- total material costs per field categorized by:
  herbicide, seed, fertilizer, insecticide, and other.

All data calculations within DBASE III were conducted to provide direct input into the financial analysis component of this study. The methodology for the financial analysis is presented in the next subsection.

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[4] The reason for this is that the OMAF guide to calculating farm machinery costs uses the straight line method of depreciation, which tends to accentuate the farm machinery cost differences between new and older equipment.

5.0 THE ECONOMIC EVALUATION MODEL - FIELD LEVEL

Within SWEEP, the overall economic evaluation is comprised of two elements, namely: 1) a financial simulation of field and farm level impacts; and 2) financial optimization using math programming to indicate the optimum mix of resources for maximum net farm returns.

The intent of this exercise is to conduct a financial simulation of field level impacts resulting from various tillage practices. Specifically, the objective is to examine the net economic impacts associated with alternative tillage practices, using the following measurements:

1. net returns per acre; and
2. net returns per labour hour.

To facilitate this quantification, partial budget models were constructed within IFPS (Interactive Financial Planing System). A unique, yet similar IFPS model was constructed for each of the four crops by each of the two machinery valuation methods (purchase price and trade-in value).

The financial analysis is comprised of the following components:

a) The machinery and/or custom costs associated with conducting fall, spring or harvest operations per field.

b) The material costs (MA) per field. (Each field represents either one of the following tillage practices: 1-conventional tillage; 2-reduced tillage; and 3-no-tillage.)

c) Fuel costs per field.

d) Paid labour costs (LC) per field.

e) Total costs (TC) per field, including all the above, (i.e. total variable costs and machinery/tractor or custom costs associated with field operations only).

f) Total time (hours) to complete all operations.

g) Crop yield and total revenue per acre.

h) Net margin on a per acre basis - 2 measures:

A) Revenue minus total costs (TC); and

B) Revenue minus material costs (MA).

i) Net return per labour hour, (including labour costs).

6.0 RESULTS AND DISCUSSION

The Tillage 2000 data was aggregated into 7 crops across 4 production years. In addition, the cost of machinery for operations performed was calculated two ways, as per Section 4.0. Consequently, 14 crop models were generated for this analysis. This section reports the results of the comparison of net returns per acre between alternative tillage practices for each crop in a static partial budget analysis.

6.1 Comparison of Net Returns Between Alternative Tillage Practices

This section summarizes results from the comparison of net returns between alternative tillage practices within a partial budget framework and analysis. Results are presented by crop, separately, for each of the following tillage practices:

1. Conventional Tillage
2. Reduced Tillage
3. No-Till

Results for all crops are presented utilizing the aggregate ("unpaired") approach to organizing the field input-output data.

6.1.1 Grain Corn

Field scale input/output data for corn was the most common and was provided from 27 cooperators from 1986 to 1989 as follows:

	1986	1987	1988	1989	TOTAL
1. Conventional	8	12	5	7	32
2. Reduced Tillage	12	14	7	10	43
3. No-Till	6	11	7	10	34
Total	26	37	19	27	109

In total, data from 109 corn fields were provided. In most cases, participating farmers had side-by-side comparisons of either conventional and reduced tillage systems, or conventional and no-till systems, or reduced tillage and no-till systems. In only a few exceptions were side-by-side comparisons conducted for all three at once. Moreover, only a few cooperators participated for all four years with exactly the same tillage comparison. Consequently, the field input/output data is highly variable within tillage practice categories, when the data is organized in this way.

The net returns per acre (revenue - total costs) from no-till exceeds the net returns from conventional and reduced tillage, using the purchase price method for valuing farm machinery (see Tables 6.1a and 6.1b). Using current market values (or trade-in values), net returns from no-till were equivalent to conventional tillage and exceeded reduced tillage by $14 (Table 6.1b). The use of trade-in values to calculate depreciation charges reduced net return per acre for no-till relative to conventional by $12 per acre.

The marginal analysis criteria does not account for the opportunity cost of labour, yet is often the most cited result and criteria for adoption in many other studies. The net returns to labour, (net returns including paid labour costs divided by total hours), indicates that no-till exceeds both conventional and reduced tillage by approximately $100/hour and $75/hour respectively, using current market value for machinery. This means that, on average, a corn producer should choose no-till practices, particularly if producers have a high opportunity cost of labour. For many corn producers, this evaluation criteria may be most important for the following reasons:

1. It may provide them an opportunity to buy, rent and farm more land.
2. It may provide an opportunity to devote more time input into other enterprises or activities including leisure.
3. It may provide an opportunity to avoid labour availability or performance problems.

When considering returns to material costs per acre (alone), conventional tillage practices exceeded the results for no-till. This occurs because material costs tend to be higher with no-till and yields tend to be lower compared to conventional tillage.

The results from similar analyses for each year, using trade-in values for machinery are

presented in Tables 6.1c to 6.1f. Given only four years data, it is not possible to identify any discernable trends. It is interesting to note that in 1988 when growing conditions were very dry, returns to no-till were below those of both conventional and reduced tillage practices. In the first three years, net returns per acre to reduced tillage practices were marginally higher than other tillage practices. However, in the last year, net returns per acre to no-till were significantly higher. It is of interest that in all four years, conservation tillage practices resulted in the highest net returns per acre.

The returns to labour, ([Revenue - TC]/Total hours), were significantly higher for no-till in 1986, 1987, and 1989 compared to conventional and reduced tillage practices. Yet in 1988, they were significantly lower than the alternatives, again, largely due to lower yields as a result of drought conditions.

6.1.2 Financial Analysis Results of Corn When Maintaining Paired Comparisons

When conducting the forgoing analysis with the paired data, as described earlier, a significant number of fields were dropped out of the analysis for each pair. Specifically, in the comparison of conventional versus reduced tillage practices, 15 fields were deleted from a possible combination of 75 fields. For the comparison of conventional and no-till practices, fields were deleted from a possible combination of 66 fields. Likewise, for the comparison of no-till and reduced tillage practices, 22 fields were also deleted from a possible combination of 77 fields.

Details of this financial analysis are presented in Tables 6.2g to 6.2i, using trade-in values for machinery calculations. Results indicate that the relative difference in net returns per acre between no-till and conventional tillage fields was $7, compared to roughly equivalent net returns per acre for conventional versus no-till. However, it is not accurate to say that no-till tillage practices generated $7 more per acre compared to conventional practices than did reduced tillage, because the mix of fields used in each paired comparison contain a large portion of unique fields. Results of paired comparisons between no-till and reduced tillage practices indicate that the net returns per acre are roughly equivalent. However, based on the returns per labour hour, no-till exceeds reduced tillage by as much as $62.

Despite minor differences in the results between the two data organization approaches, the overall trends and conclusions remain the same. Namely, no-till tillage practices exceed or are at least equivalent to reduced tillage practices based on net returns per labour and net returns per acre. Also, no-till practices generate equivalent net returns per acre and higher net returns per labour than those of conventional tillage practices.

6.1.3 Risk Analysis

To determine the relative variability and risks associated with these practices, a risk assessment was undertaken. The analysis investigated the variability associated with material costs and yields for each tillage practice. From this, the 90 percent confidence interval for net returns on corn were calculated over the 4 year study period (Table 6.1j).

Results indicate that the lower and upper bounds of the confidence intervals between no-till and conventional tillage practices for returns to acre are not statistically different. Although, the confidence interval boundaries of reduced tillage (for returns to acre) are significantly lower than conventional and no-till. This suggests that no-till is not any riskier than conventional tillage practices.

With respect to returns to labour, the boundaries of no-till exceed both reduced and conventional tillage practices. No-till has greater variability than reduced and conventional tillage. However, the large difference in boundaries concludes that no-till, when incorporating risks, is the superior practice when ranking by returns to labour.

Table 6.1a **Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices On Grain Corn, Combined for 1986 to 1989, Using Purchase Price for Machinery Calculations**

	Grain Corn		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		Average 1986 - 89	
Fall Operations	21.07	10.94	1.32
Spring Operations	46.62	43.41	31.21
Harvest Operations	79.93	79.28	77.91
SubTotal:	147.63	133.63	110.44
- Fuel Costs (FC)	2.38	1.84	1.20
- Labour Costs (LC)	13.66	10.51	7.74
Material Costs (MA):			
Seed	29.17	29.18	29.93
Fertilizer	51.25	51.63	54.04
Herbicide	23.55	25.51	28.84
Insecticide	3.28	3.45	1.58
SubTotal:	107.25	109.76	114.63
Total Costs (TC):	254.88	243.39	225.08
Total Hours	1.36	1.06	.77
Yield (bu/acre)	121.51	117.21	118.12
Crop Price ($/bu)	3.25	3.25	3.25
Total Revenue	394.92	380.95	383.88
Margin:			
Revenue - MA	287.66	271.18	269.25
Revenue - TC	140.04	137.55	158.80
(Revenue - TC)/Total Hours	102.97	129.76	206.23

Table 6.1b **Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices on Grain Corn, Combined for 1986 to 1989, Using Trade-in Value for Machinery Calculations**

	Grain Corn		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		Average 1986 - 89	
Fall Operations	14.75	8.72	1.17
Spring Operations	38.05	35.19	26.93
Harvest Operations	72.62	71.97	71.89
SubTotal:	125.41	115.88	99.99
- Fuel Costs (FC)	2.38	1.84	1.20
- Labour Costs (LC)	13.66	10.51	7.74
Material Costs (MA):			
Seed	29.17	29.18	29.93
Fertilizer	51.25	51.63	54.04
Herbicide	23.55	25.51	28.84
Insecticide	3.28	3.45	1.55
SubTotal:	107.25	109.76	114.63
Total Costs (TC):	232.66	225.65	214.62
Total Hours	1.36	1.06	.77
Yield (bu/acre)	121.51	117.21	118.12
Crop Price ($/bu)	3.25	3.25	3.25
Total Revenue	394.92	380.95	383.88
Margin:			
Revenue - MA	287.66	271.18	269.25
Revenue - TC	162.25	155.30	169.26
(Revenue - TC)/Total Hours	119.30	146.51	219.82

Table 6.1c **Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices On Grain Corn, For 1986, Using Trade-In Value for Machinery Calculations**

	Grain Corn		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		1986	
Fall Operations	13.39	8.97	1.15
Spring Operations	32.12	29.55	19.09
Harvest Operations	64.08	70.60	68.30
SubTotal:	109.59	109.12	88.54
- Fuel Costs (FC)	2.10	1.58	0.55
- Labour Costs (LC)	12.23	10.08	5.80
Material Costs (MA):			
Seed	29.23	28.64	28.26
Fertilizer	42.77	43.50	56.42
Herbicide	20.89	22.25	27.49
Insecticide	5.04	3.98	4.77
SubTotal:	97.92	98.37	116.93
Total Costs (TC):	207.51	207.49	205.47
Total Hours	1.22	1.03	0.58
Yield (bu/acre)	108.50	108.98	106.70
Crop Price ($/bu)	3.25	3.25	3.25
Total Revenue	352.62	354.20	346.78
Margin:			
Revenue - MA	254.70	255.83	229.84
Revenue - TC	145.11	146.70	141.30
(Revenue - TC)/Total Hours	118.94	142.43	243.62

Table 6.1d **Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices On Grain Corn, For 1987, Using Trade-In Value for Machinery Calculations**

	Grain Corn		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		1987	
Fall Operations	13.02	10.72	1.29
Spring Operations	38.02	32.27	28.98
Harvest Operations	80.58	77.81	84.58
SubTotal:	131.61	120.80	114.85
- Fuel Costs (FC)	1.90	1.37	1.03
- Labour Costs (LC)	12.60	11.33	9.32
Material Costs (MA):			
Seed	28.39	27.52	28.96
Fertilizer	50.66	50.01	51.79
Herbicide	28.23	27.84	31.10
Insecticide	2.60	3.16	1.32
SubTotal:	109.88	108.53	113.99
Total Costs (TC):	241.49	229.32	228.34
Total Hours	1.26	1.13	0.93
Yield (bu/acre)	136.68	137.58	138.74
Crop Price ($/bu)	3.25	3.25	3.25
Total Revenue	444.19	447.13	450.89
Margin:			
Revenue - MA	334.32	338.60	336.90
Revenue - TC	202.70	217.81	222.05
(Revenue - TC)/Total Hours	160.87	192.75	238.76

Table 6.1e **Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices On Grain Corn, For 1988, Using Trade-In Value for Machinery Calculations**

	Grain Corn		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		1988	
Fall Operations	12.68	3.61	2.39
Spring Operations	36.83	33.74	36.45
Harvest Operations	68.65	61.57	62.29
SubTotal:	118.15	98.92	101.13
- Fuel Costs (FC)	1.81	1.44	0.98
- Labour Costs (LC)	11.94	8.17	8.09
Material Costs (MA):			
Seed	29.56	30.87	29.77
Fertilizer	52.45	46.54	40.64
Herbicide	15.91	26.40	22.24
Insecticide	3.83	5.43	0.82
SubTotal:	101.76	109.24	93.46
Total Costs (TC):	219.91	208.16	194.59
Total Hours	1.19	0.82	0.81
Yield (bu/acre)	101.46	101.70	90.56
Crop Price ($/bu)	3.25	3.25	3.25
Total Revenue	329.75	330.53	294.31
Margin:			
Revenue - MA	227.99	221.28	200.85
Revenue - TC	109.84	122.36	99.72
(Revenue - TC)/Total Hours	92.30	149.22	123.11

Table 6.1f **Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices On Grain Corn, For 1989, Using Trade-In Value for Machinery Calculations**

	Grain Corn		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		1989	
Fall Operations	20.73	9.22	0.21
Spring Operations	45.73	47.07	22.72
Harvest Operations	71.57	72.70	66.79
SubTotal:	138.03	128.99	89.72
- Fuel Costs (FC)	3.94	3.07	1.94
- Labour Costs (LC)	18.33	11.51	6.92
Material Costs (MA):			
Seed	30.18	30.95	32.12
Fertilizer	61.09	67.20	64.48
Herbicide	24.03	25.56	31.79
Insecticide	2.05	1.82	0.39
SubTotal:	117.35	125.53	128.78
Total Costs (TC):	255.38	254.53	218.50
Total Hours	1.82	1.15	0.68
Yield (bu/acre)	124.71	109.44	121.58
Crop Price ($/bu)	3.25	3.25	3.25
Total Revenue	405.32	355.68	395.14
Margin:			
Revenue - MA	287.97	230.15	266.35
Revenue - TC	149.94	101.15	176.63
(Revenue - TC)/Total Hours	82.38	87.96	259.75

Table 6.1g Comparison of Average Annual Production Costs and Net Returns for Conventional and Reduced Tillage Practices On Grain Corn, For 1986-1989, Using Trade-In Value for Machinery Calculations

	Grain Corn	
	(Conventional)	(Reduced)
	(dollars per acre)	
Cost of Conducting Operations:	1986 - 1989	
Fall Operations	15.27	10.92
Spring Operations	39.62	36.25
Harvest Operations	75.87	75.66
SubTotal:	130.76	122.83
- Fuel Costs (FC)	2.49	2.08
- Labour Costs (LC)	13.35	12.02
Material Costs (MA):		
Seed	28.41	28.41
Fertilizer	50.60	51.20
Herbicide	25.66	25.19
Insecticide	3.63	4.37
SubTotal:	108.30	109.17
Total Costs (TC):	239.05	231.99
Total Hours	1.34	1.21
Yield (bu/acre)	126.45	122.78
Crop Price ($/bu)	3.25	3.25
Total Revenue	410.95	399.04
Margin:		
Revenue - MA	302.66	289.87
Revenue - TC	171.90	167.04
(Revenue - TC)/Total Hours	131.62	140.45

Table 6.1h **Comparison of Average Annual Production Costs and Net Returns for Conventional and No Tillage Practices On Grain Corn, For 1986-1989, Using Trade-In Value for Machinery Calculations**

	Grain Corn	
	(Conventional)	(No-Tillage)
	(dollars per acre)	
Cost of Conducting Operations:	1986 - 1989	
Fall Operations	13.14	1.35
Spring Operations	40.08	29.71
Harvest Operations	77.65	76.62
SubTotal:	130.87	107.68
- Fuel Costs (FC)	2.14	1.18
- Labour Costs (LC)	13.17	9.33
Material Costs (MA):		
Seed	29.31	29.30
Fertilizer	52.35	54.41
Herbicide	25.04	29.57
Insecticide	1.69	1.69
SubTotal:	108.38	115.40
Total Costs (TC):	239.25	223.08
Total Hours	1.31	0.93
Yield (bu/acre)	128.28	125.29
Crop Price ($/bu)	3.25	3.25
Total Revenue	416.90	407.18
Margin:		
Revenue - MA	308.52	291.77
Revenue - TC	177.65	184.10
(Revenue - TC)/Total Hours	135.61	197.96

Table 6.11 Comparison of Average Annual Production Costs and Net Returns for No-Till and reduced Tillage Practices On Grain Corn, For 1986-1989, Using Trade-In Value for Machinery Calculations

	Grain Corn	
	(Reduced)	(No-Tillage)
	(dollars per acre)	
Cost of Conducting Operations:	1986 - 1989	
Fall Operations	6.42	0.80
Spring Operations	34.75	23.58
Harvest Operations	74.61	72.66
SubTotal:	115.78	97.04
- Fuel Costs (FC)	1.49	1.12
- Labour Costs (LC)	9.23	6.81
Material Costs (MA):		
Seed	29.25	29.25
Fertilizer	51.55	54.10
Herbicide	28.76	33.69
Insecticide	1.54	1.54
SubTotal:	111.11	118.90
Total Costs (TC):	226.88	215.95
Total Hours	0.93	0.68
Yield (bu/acre)	119.30	117.59
Crop Price ($/bu)	3.25	3.25
Total Revenue	387.71	382.16
Margin:		
Revenue - MA	276.61	263.25
Revenue - TC	160.83	166.21
(Revenue - TC)/Total Hours	172.94	244.42

Table 6.1j **Confidence Intervals of Average Annual Production Costs and Net Returns for Alternative Tillage Practices on Grain Corn, Combined for 1986 to 1989, Using Trade-in Value for Machinery Calculations**

	Grain Corn		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(90% confidence interval)		
Net Returns to Acre			
lower bound	139.47	128.67	135.82
upper bound	203.58	189.78	204.39
Net Returns to Labour			
lower bound	102.55	123.72	160.31
upper bound	149.69	182.48	234.00

6.2 Other Crops

6.2.1 Soybeans

Over the four year data period, 18 cooperators experimented with the introduction of alternative tillage practices on 63 fields of soybeans. The distribution of data representing field input/output results over the study period is as follows:

	1986	1987	1988	1989	TOTAL
1. Conventional	2	2	8	5	17
2. Reduced Tillage	4	5	10	5	24
3. No-Till	4	3	9	6	22
Total	10	9	27	16	63

Compared to grain corn, the amount of field data for soybeans is considerably less, with an uneven distribution over the study period.

Given the scarcity of observations, only the average results for the study period, (1986-89), are summarized below in Table 6.2.1 using trade-in values for farm machinery.

It is evident, in terms of the net returns per acre, that financial returns to conventional tillage exceed those of both reduced and no-till practices by $18 and $52 per acre respectively. However, the difference between conventional and reduced (minimum) tillage practices is marginal and may not be statistically significant given the relatively small data set. Clearly, net returns per acre for no-till practices tend to be far below its alternatives. It is our understanding that the main reason for this result, is that soybeans are more sensitive to weed competition compared to corn, and with conservation practices, more weed pressure is possible.

When considering the returns to labour, conventional tillage practices exceed the returns for reduced (minimum) tillage and no-till by as much as $9/hour and $11/hour respectively. Again, this evaluation criteria may be most important for some soybean producers, for the same reasons outlined previously for corn.

6.2.2 Spring Grain

Eight spring grain producers cooperated with Tillage 2000 at various points throughout the study period to generate 28 fields of input/output data. The distribution of data among the tillage practices is presented below:

	1986	1987	1988	1989	TOTAL
1. Conventional	2	3	2	2	9
2. Reduced Tillage	2	3	4	3	12
3. No-Till	0	2	2	3	7
Total	4	8	8	8	28

Due to the limited number of field observations, only the average annual results combined for 1986 to 1989 are analyzed. The average results for the study period for each tillage practice on spring grains are presented in Table 6.2.2, using trade-in values for farm machinery only.

Results of the analysis of net returns per acre for spring grains indicate that no-till and reduced tillage practices tend to generate less returns than conventional practices. The net returns per acre for no-till were significantly below the alternatives, by as much as $73 acre[5].

In this case, the returns to labour are larger for conventional than reduced tillage and no-till practices.

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5 Although the absolute results for no-till are negative compared to the alternative tillage practices, it would be incorrect to interpret that no-till practices on barley result in a loss of revenue. Rather, the important measure for this and other crops is the relative difference between results among the alternative tillage practices.

Table 6.2.1 Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices on Soybeans, Combined for 1986 to 1989, Using Trade-in Value for Machinery Calculations

	Soybeans		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		Average 1986 - 89	
Fall Operations	15.60	8.85	0.35
Spring Operations	31.07	29.90	27.47
Harvest Operations	34.29	34.16	33.47
SubTotal:	80.96	72.92	61.29
- Fuel Costs (FC)	1.86	1.37	0.87
- Labour Costs (LC)	12.14	11.37	8.05
Material Costs (MA):			
Seed	27.02	27.02	27.74
Fertilizer	12.00	11.06	11.63
Herbicide	31.49	36.41	56.35
Insecticide	0.04	0.03	0.00
SubTotal:	71.55	75.22	95.97
Total Costs (TC):	152.51	148.14	157.71
Total Hours	1.21	1.14	0.82
Yield (bu/acre)	40.10	36.89	33.47
Crop Price ($/bu)	7.10	7.10	7.10
Total Revenue	284.71	261.90	237.62
Margin:			
Revenue - MA	213.16	186.68	141.65
Revenue - TC	132.20	113.76	80.36
(Revenue - TC)/Total Hours	109.26	99.79	98.00

Table 6.2.2 Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices on Spring Grains, Combined for 1986 to 1989, Using Trade-In Value for Machinery Calculations

	Spring Grains		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		Average 1986 - 89	
Fall Operations	11.39	11.01	3.38
Spring Operations	21.27	24.32	23.44
Harvest Operations	28.14	29.91	22.33
SubTotal:	60.80	65.24	49.15
- Fuel Costs (FC)	1.63	1.50	1.36
- Labour Costs (LC)	13.99	12.61	8.27
Material Costs (MA):			
Seed	18.87	19.69	17.63
Fertilizer	28.11	25.32	25.88
Herbicide	9.31	14.35	25.86
Insecticide	0.00	0.00	8.71
SubTotal:	56.29	59.36	78.09
Total Costs (TC):	117.09	124.60	127.25
Total Hours	1.40	1.26	0.83
Yield (bu/acre)	49.63	48.42	26.30
Crop Price ($/bu)	2.70	2.70	2.70
Total Revenue	134.01	130.75	71.01
Margin:			
Revenue - MA	77.72	71.39	-7.08
Revenue - TC	16.92	6.14	-56.24
(Revenue - TC)/Total Hours	11.76	4.52	-67.76

Table 6.2.3 Comparison of Average Annual Production Costs and Net Returns for Alternative Tillage Practices on Wheat, Combined for 1986 to 1989, Using Trade-In Value for Machinery Calculations

	Wheat		
	AVERAGE 1 (Conventional)	AVERAGE 2 (Reduced)	AVERAGE 3 (No-Till)
	(dollars per acre)		
Cost of Conducting Operations:		Average 1986 - 89	
Fall Operations	15.20	9.56	4.03
Spring Operations	11.42	15.58	16.49
Harvest Operations	27.17	26.86	29.19
SubTotal:	53.79	52.00	49.71
Material Costs (MA):			
Seed	25.47	33.54	33.86
Fertilizer	54.44	54.99	58.34
Herbicide	8.14	3.90	10.03
Insecticide	0.00	0.00	0.00
SubTotal:	88.06	92.42	102.23
Fuel Costs (FC)	1.09	0.81	0.51
Labour Costs (LC)	11.83	9.88	6.34
Total Costs (TC):	141.84	144.42	151.94
Total Hours	1.14	0.96	0.66
Yield (bu/acre)	56.54	59.30	53.75
Crop Price ($/bu)	3.80	3.80	3.80
Total Revenue	214.86	225.34	204.23
Margin:			
Revenue - MA	126.81	132.92	102.01
Revenue - TC	73.02	80.92	52.29
(Revenue - TC)/Total Hours	64.05	84.29	79.23

7.0 GENERAL DISCUSSION OF TILLAGE 2000 RESULTS

This analysis of Tillage 2000 field data does not consider the effect of soil texture on the success of the conservation tillage system. A detailed analysis is available in the Tillage 2000 1989 Progress Report. However, from the foregoing analysis of Tillage 2000 field data for 1986 to 1989, a number of general observations and conclusions can be made:

1) The adoption of no-till practices produced equivalent net returns per acre in corn to conventional tillage. Adoption of reduced (minimum) tillage practices produced generally higher yields and higher net returns per acre in wheat. In soybeans and spring grains, yields and net returns were lower for conservation tillage practices than conventional practices.

2) Overall, although no-till practices resulted in marginally lower yields and higher input costs per acre, a significant machinery and labour savings with no-till resulted in significantly higher net returns per hour compared to conventional practices in corn and wheat.

3) For soybeans and spring grains, conventional tillage practices generated higher net returns per acre compared to reduced or no-till practices, however, the difference between conventional and reduced is marginal and likely not significant given the small number of observations.

4) There is perhaps no ideal way to incorporate a calculation of machinery costs into an evaluation of net returns to alternative practices, particularly when comparing field based demonstration plots. For example, the same basic equipment (tractors for example), were used for key tasks in each tillage practice. In an operating situation the individual farmer may well be able to alter his equipment complement to the changed requirements.

   Additionally, the calculation of machinery costs was based on an hourly cost calculation. Even if the equipment is used less, the actual total depreciation and financial cost could stay the same depending on the farmer's replacement policy and hence provide a limited saving on equipment costs. If farmers are able to extend the life of their equipment through lower usage levels, then they could achieve lower equipment costs through a no-

till system. Consequently, equipment cost savings will depend on each farm situation and no amount of calculation of average or synthesized equipment and cost calculations will determine the impact on machinery cost on each farm situation.

5) This year's results differ from last year in the following respects:
   (i) no-till produced the equivalent net returns per acre for corn compared to conventional tillage practices;
   (ii) conventional tillage produced the highest net returns to labour for soybeans;
   (iii) conventional tillage produced the highest net returns per acre for spring grains; and
   (iv) reduced (minimum) tillage produced the highest net returns per acre for wheat.

   These differences can be attributed to data alterations and definitional changes.

Last year's results indicated reduced tillage practices resulted in the highest net returns per acre for grain corn. This year's results differ because average yield from no-till and conventional tillage increased while the average yield from reduced tillage decreased.

The average labour used per acre decreased for conventional tillage while the average net returns per acre decreased for reduced tillage for soybeans this year. These movements resulted in conventional tillage having the highest average net returns to labour for soybeans.

Average spring grain yields from conventional tillage practices significantly increased relative to reduced tillage practices. Hence, average net returns per acre from conventional tillage were higher than reduced tillage in this year's results.

Last year's results indicated no-till yielded the highest net returns per acre for wheat. This year's results show significant decreases in average total costs for conventional tillage and an increase in average yields for both conventional tillage and reduced tillage. As a result, this year's analysis shows reduced and conventional tillage produced equivalent net returns per acre which were higher than net returns to no-till practices.

ANNEX 6.1a

COMPARISON OF PRODUCTION COSTS AND NET RETURNS FOR GRAIN CORN, USING PURCHASE PRICE FOR MACHINERY

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986-89
USING PURCHASE RATE FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	1-87	2-87	1-87	3-87	1-88	3-88	1-86	2-86	3-86	1-87	2-87	3-87	1-88	3-88	2-86	3-86	2-87	3-87	2-88
Operations Costs:																			
Cost of Fall Operations	13.93	9.75	23.28	0.00	44.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.59
Cost of Spring Operations	19.03	16.15	68.71	41.55	36.73	113.33	69.69	38.57	14.09	89.96	23.97	20.80	90.14	31.60	31.52	21.19	51.67	27.25	24.00
Cost of Harvest Operations	60.55	59.33	103.09	139.72	117.78	67.97	82.66	80.76	78.59	84.45	71.37	74.64	66.43	73.81	87.55	89.78	69.00	74.57	69.63
Total Costs of Operations	93.52	85.23	195.08	181.27	199.39	181.30	152.35	119.33	92.68	174.41	95.34	95.44	156.57	105.41	119.07	110.97	120.67	101.82	99.30
- Fuel Costs	2.61	2.06	1.96	0.82	1.48	0.84	0.57	0.40	0.18	1.09	0.56	0.52	0.89	0.73	0.89	0.20	0.20	0.00	1.22
- Labour Costs (LC)	10.00	9.20	17.00	9.00	13.00	9.50	8.50	7.00	5.00	9.00	5.50	4.50	11.70	8.20	9.30	5.00	9.00	7.00	10.30
Material Costs:																			
Seed	27.40	27.40	30.30	30.30	26.14	26.14	33.32	33.32	33.32	33.32	33.32	33.32	32.90	32.90	27.37	27.37	27.31	27.31	26.20
Fertilizer	43.26	40.25	43.00	43.00	58.00	58.00	81.87	81.87	81.87	81.87	49.00	49.00	49.00	35.71	35.71	75.87	75.87	56.21	56.21	40.31
Herbicide	32.10	32.10	13.60	13.60	5.00	5.00	20.37	20.37	20.37	20.37	22.30	30.50	35.00	0.00	24.47	21.70	20.45	13.45	13.45	11.31
Insecticide	1.00	1.00	0.00	0.00	4.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30
Total Material Costs (MA)	103.84	100.83	87.70	87.70	93.14	93.14	135.56	135.56	135.56	135.50	113.62	118.12	68.61	93.00	124.94	131.69	96.97	96.97	79.12
Total Costs (TC)	197.36	186.06	282.86	269.05	292.53	274.44	287.91	254.89	228.24	279.91	208.96	213.56	225.18	198.49	244.01	242.66	217.64	198.79	178.42
Total Hours	1.00	0.92	1.70	0.90	1.30	0.95	0.85	0.70	0.50	0.90	0.55	0.45	1.17	0.82	0.93	0.50	0.90	0.70	1.03
Yield	87.00	86.00	113.20	113.30	104.00	91.00	133.30	132.30	127.50	130.20	111.00	134.00	89.20	105.90	136.20	141.30	109.30	120.40	109.20
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	282.75	279.50	367.90	368.23	338.00	295.75	433.23	429.90	414.38	423.15	363.35	438.10	289.90	344.18	442.65	459.23	355.23	391.30	354.90
Margin A: Revenue - TC	85.39	93.44	85.04	99.18	45.47	21.31	145.32	175.09	186.14	143.24	154.39	224.54	64.72	145.69	198.64	216.57	137.59	192.51	176.48
Margin B: Revenue - MA	178.91	178.67	280.12	280.45	244.86	202.61	297.67	294.42	278.82	317.65	249.73	319.98	221.29	251.18	317.71	327.54	258.26	294.33	275.78
Margin C: Revenue - (MA + LC)	168.11	169.47	263.12	271.45	231.86	193.11	289.17	287.42	273.82	308.65	244.23	315.48	209.59	242.98	308.41	322.54	249.26	287.33	265.48

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3-no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986 87
USING PURCHASE RATE FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																	
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
	3-88	2-89	3-89	2-86	3-86	2-89	3-89	1-86	2-86	2-88	3-88	1-87	2-87	2-87	3-87	1-86	3-86	1-87	3-87
Operations Costs:																			
Cost of Fall Operations	0.00	0.00	0.00	15.57	5.60	12.00	0.00	26.49	10.92	0.00	0.00	22.56	0.00	12.76	0.00	16.85	0.00	11.72	0.00
Cost of Spring Operations	28.55	32.96	27.48	22.89	14.55	25.50	23.50	13.27	13.27	49.52	22.25	38.78	41.41	41.41	23.02	35.52	28.40	72.98	93.64
Cost of Harvest Operations	68.46	63.58	71.13	79.70	76.58	85.12	83.36	51.09	60.10	66.12	67.61	74.84	75.84	76.82	74.98	56.31	42.41	80.90	78.42
Total Costs of Operations	97.01	96.54	98.61	118.16	96.73	122.62	106.86	90.85	84.37	115.64	89.86	136.18	117.25	130.99	98.00	108.68	70.81	165.60	172.06
- Fuel Costs	0.56	0.84	0.28	0.70	0.00	0.00	0.00	0.00	1.04	0.36	0.36	1.53	1.32	1.56	1.09	2.28	1.48	3.60	3.76
- Labour Costs (LC)	7.00	6.00	6.00	5.00	2.30	0.00	0.00	7.00	9.00	5.50	3.00	15.40	14.30	16.00	12.70	13.90	9.30	19.00	21.50
Material Costs:																			
Seed	26.20	28.18	28.18	30.00	30.00	30.00	30.00	33.60	33.60	40.00	40.00	28.37	28.37	28.37	28.37	26.65	26.65	36.00	36.00
Fertilizer	40.86	114.80	114.80	49.24	49.36	40.00	40.00	27.00	27.00	31.56	31.56	63.90	63.90	63.90	63.90	37.42	43.03	86.95	86.95
Herbicide	11.31	12.63	12.63	26.92	26.92	25.70	25.70	18.00	18.00	46.70	49.50	35.72	35.72	35.72	57.44	18.30	18.30	23.86	23.86
Insecticide	1.30	3.90	3.90	12.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.60	16.60	0.75	0.75
Total Material Costs (MA)	79.67	159.51	159.51	118.16	118.28	111.70	111.70	78.60	78.60	118.34	121.14	128.07	128.07	128.07	149.79	98.97	104.58	147.56	147.56
Total Costs (TC)	176.68	256.05	258.12	236.32	215.01	234.32	218.56	169.45	162.97	233.98	211.00	264.25	245.32	259.06	247.79	207.65	175.39	313.16	319.62
Total Hours	0.70	0.60	0.60	0.50	0.23	0.00	0.00	0.70	0.90	0.55	0.30	1.54	1.43	1.60	1.27	1.39	0.93	1.90	2.15
Yield	102.00	99.30	116.60	115.30	100.40	146.60	140.10	112.00	97.00	59.50	64.50	131.70	134.20	132.70	128.30	74.00	54.00	127.10	140.70
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	331.50	322.73	378.95	374.73	352.30	476.45	481.33	364.00	317.85	193.38	209.63	428.03	436.15	431.28	416.98	240.50	175.50	413.00	457.28
Margin A: Revenue - TC	154.82	66.67	120.83	138.41	137.29	242.13	262.77	194.55	154.88	-40.61	-1.38	163.77	190.83	172.22	169.18	32.85	0.11	99.91	137.66
Margin B: Revenue - MA	251.83	163.22	219.44	256.56	234.02	364.75	369.63	285.40	239.25	75.04	88.49	299.96	308.08	303.21	267.19	141.53	70.92	265.52	309.72
Margin C: Revenue - (MA + LC)	244.83	157.22	213.44	251.56	231.72	364.75	369.63	278.40	230.25	69.54	85.49	284.55	293.78	287.21	254.49	127.63	61.62	246.52	288.22

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3-no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN I-2000 PARTICIPANTS, 1986-89
USING PURCHASE RATE PRICE FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																
	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
	1-86	2-86	1-89	2-89	2-88	3-88	2-89	3-89	1-87	2-87	3-87	3-87	1-89	2-89	3-89	3-89	1-89	2-89	2-89
Operations Costs:																			
Cost of Fall Operations	30.73	14.25	27.90	14.38	0.00	0.00	0.00	0.00	15.29	6.59	0.00	0.00	20.28	1.30	0.00	0.00	19.85	13.72	0.00
Cost of Spring Operations	38.86	46.89	123.25	123.10	61.10	51.02	46.49	41.18	25.11	25.11	24.07	42.34	53.47	42.45	25.97	39.38	87.12	61.03	94.19
Cost of Harvest Operations	68.72	69.24	83.34	83.99	69.85	68.68	68.75	67.31	87.12	89.50	100.90	89.50	80.59	77.50	73.30	75.30	105.18	100.00	101.55
Total Costs of Operations	146.31	129.58	234.57	221.48	130.95	119.70	115.24	108.49	127.52	121.20	124.96	131.84	154.34	121.25	99.26	114.67	212.15	174.82	195.74
- Fuel Costs	4.54	3.14	3.88	3.31	1.55	1.31	5.97	10.50	2.10	1.49	1.03	1.65	3.37	1.77	1.84	1.46	5.18	2.94	4.10
- Labour Costs (LC)	19.00	13.10	19.40	17.50	10.20	9.00	7.30	6.10	9.60	7.60	14.10	8.90	12.30	10.30	6.40	8.50	16.50	11.60	11.60
Material Costs:																			
Seed	20.89	20.89	32.40	32.40	20.88	20.88	36.53	36.53	31.62	31.62	31.62	31.62	33.00	33.00	33.00	33.00	24.91	24.91	24.91
Fertilizer	44.36	44.36	55.39	55.39	35.56	35.56	34.10	34.10	33.46	33.46	33.46	33.46	65.29	65.29	65.29	65.29	59.43	66.43	66.43
Herbicide	18.63	18.63	13.92	13.92	36.89	36.89	30.86	30.86	25.70	25.70	36.27	25.70	41.70	41.70	41.70	41.70	20.85	19.70	19.70	19.70
Insecticide	0.26	0.26	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	92.14	92.14	101.96	101.96	101.33	101.33	101.49	101.49	90.78	90.78	101.35	90.78	139.99	139.99	139.99	119.14	104.84	111.04	111.04
Total Costs (TC)	238.45	221.72	336.53	323.44	232.28	221.03	216.73	209.98	218.30	211.98	226.31	222.62	294.33	261.24	239.25	233.81	316.19	285.86	306.78
Total Hours	1.90	1.31	1.94	1.75	1.02	0.90	0.73	0.61	0.96	0.76	1.41	0.89	1.23	1.03	0.64	0.85	1.65	1.16	1.16
Yield	103.00	91.00	122.30	123.40	83.00	80.10	94.90	91.90	170.00	175.90	176.00	182.00	170.10	161.20	150.00	154.90	113.90	91.80	90.00
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	334.75	295.75	397.48	401.05	269.75	260.33	308.43	298.68	552.50	571.68	572.00	591.50	552.82	523.90	487.50	503.43	370.18	298.35	292.50
Margin A: Revenue - TC	96.30	74.03	60.95	77.61	37.47	39.29	91.70	88.69	334.20	359.70	345.69	368.88	258.50	262.66	248.25	269.61	53.99	12.49	-14.28
Margin B: Revenue - MA	242.61	203.61	295.52	299.09	168.42	159.00	206.94	197.19	461.72	480.90	470.65	500.72	412.83	383.91	347.51	384.29	266.14	187.31	181.46
Margin C: Revenue - (MA + LC)	223.61	190.51	276.12	281.59	158.22	150.00	199.64	191.09	452.12	473.30	456.55	491.82	400.53	373.61	341.11	375.79	249.64	175.71	169.86

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced-till, 3-no-till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986 89
USING PURCHASE RATE PRICE FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																	
	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
	2-89	3-89	1-89	3-89	1 87	2-87	1-87	2-87	3 87	1-86	2 86	1 87	2 87	2 87	1 88	2 88	2 88	2 86	3 86
Operations Costs:																			
Cost of Fall Operations	17.22	0.00	24.87	0.00	35.31	35.31	36.61	29.44	15.40	36.79	56.69	10.39	10.80	8.25	10.47	8.31	10.80	15.56	2.14
Cost of Spring Operations	61.80	31.24	36.43	12.05	53.67	54.14	49.05	49.05	43.75	24.61	23.81	31.09	31.09	38.52	28.59	28.59	28.59	61.57	20.87
Cost of Harvest Operations	140.91	99.15	60.17	72.25	77.63	75.27	97.59	93.68	88.59	90.14	87.36	87.20	90.46	93.58	78.82	78.82	75.56	81.56	84.66
Total Costs of Operations	219.93	130.38	121.47	84.30	166.62	164.72	183.25	172.17	147.74	151.54	167.86	128.68	132.34	140.35	117.88	115.72	114.95	158.69	107.67
- Fuel Costs	4.10	1.82	2.17	0.82	3.34	3.24	1.66	1.38	0.82	1.52	1.47	1.26	1.33	1.32	1.34	1.22	1.34	1.42	0.62
- Labour Costs (LC)	12.90	7.20	16.30	6.10	20.30	19.80	8.70	7.30	4.50	13.80	14.80	7.80	9.10	8.20	7.80	7.20	9.10	8.20	6.20
Material Costs:																			
Seed	24.91	24.91	32.00	32.00	26.33	26.33	20.90	20.90	20.90	31.50	31.50	30.60	30.60	30.60	30.50	30.50	30.50	27.19	27.19
Fertilizer	66.43	66.43	59.60	59.60	5.27	5.27	88.29	88.29	88.29	59.64	59.64	84.44	84.44	84.44	70.91	70.91	70.91	42.34	52.40
Herbicide	19.70	54.11	36.22	36.22	22.73	22.73	22.90	22.90	22.90	18.20	18.20	17.70	17.70	17.70	32.03	21.02	21.03	23.06	31.94
Insecticide	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00	11.00	0.00	0.00
Total Material Costs (MA)	111.04	145.45	127.82	127.82	55.33	55.33	132.09	132.09	141.09	109.34	109.34	132.74	132.74	132.74	133.44	133.43	133.44	92.59	111.61
Total Costs (TC)	330.97	275.83	249.29	212.12	221.95	220.05	315.34	304.26	288.83	260.88	277.20	261.42	265.08	273.09	251.32	249.15	248.39	251.28	219.28
Total Hours	1.29	0.72	1.63	0.61	2.03	1.98	0.87	0.73	0.45	1.38	1.48	0.78	0.91	0.82	0.78	0.72	0.91	0.82	0.62
Yield	111.10	87.80	109.30	140.50	139.40	133.30	182.90	177.20	152.60	125.30	113.50	176.30	191.60	190.60	121.60	142.40	134.50	103.00	100.00
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	361.08	285.35	355.23	456.63	453.05	433.23	594.43	575.90	495.95	407.23	368.88	572.98	622.70	619.45	395.20	462.80	437.13	334.75	351.00
Margin A: Revenue - TC	30.11	9.52	105.94	244.51	231.10	213.17	279.09	271.64	207.12	146.35	91.68	311.56	357.62	346.36	143.88	213.65	188.74	83.47	131.72
Margin B: Revenue - MA	250.04	139.90	227.41	328.81	397.72	377.90	462.34	443.81	354.06	297.89	259.54	440.24	489.96	486.71	261.76	329.37	303.69	242.16	239.39
Margin C: Revenue - (MA + LC)	237.14	132.70	211.11	322.71	377.42	358.10	453.64	436.51	350.36	284.09	244.74	432.44	480.86	478.51	253.96	322.17	294.59	233.96	233.19

NOTES:
Under each field number is the tillage type (1 conventional, 2 reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986 BY
USING PURCHASE RATE PRICE FOR MACHINERY
(Dollars per Acre)

	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	2-87	3-87	2-88	3 88	1 87	3-87	1 87	3 87	1 86	2 86	2 86	3 86	1 87	2 87	2 87	3 87	1 86	2-86	1 87
Operations Costs:																			
Cost of Fall Operations	16.00	2.66	0.00	0.00	7 [illegible]	0.00	23.00	0.00	11.00	8.48	8.48	0.00	32.02	30.25	26.25	0.00	8.46	0.00	15.21
Cost of Spring Operations	18.79	18.09	86.26	14 [illegible]	18.20	15.17	30.66	15.88	56.46	46.31	29.08	24.60	51.12	44.64	49.00	31.00	26.39	26.39	36.49
Cost of Harvest Operations	56.65	55.87	60.1[illegible]	59.95	88.39	97.52	81.89	80.65	80.34	77.69	77.04	72.28	146.48	141.78	136.10	132.72	62.58	69.64	62.07
Total Costs of Operations	91.52	76 [illegible]	146.30	74.29	113.04	112.69	136.44	96.52	148.68	132.48	114.60	96.88	229.62	216.67	211.43	163.72	97.43	96.03	113.78
- Fuel Costs	1.24	[illegible].04	1.60	0.86	0.87	0.39	3.25	1.30	2.05	1.51	1.41	0.83	0.60	0.62	0.20	0.19	2.70	2.54	2.16
- Labour Costs (LC)	8 [illegible]	6.70	5.30	3.60	7.20	4.90	17.00	8.40	13.00	10.00	9.30	7.00	17.30	17.40	16.90	8.70	8.90	8.40	9.10
Material Costs:																			
Seed	28.00	28.00	28.00	28.00	27.10	27.10	33.09	33.09	25.00	25.00	25.00	25.00	23.91	23.91	23.91	23.91	28.00	28.00	24.57
Fertilizer	45.50	45.50	30.04	30.04	39.39	39.30	52.41	52.41	17.95	17.95	17.95	35.90	15.10	15.10	15.10	20.70	42.00	42.00	54.05
Herbicide	24.40	24.40	24.42	24.42	48.77	59.77	20.16	52.72	30.90	30.97	30.90	30.90	37.02	37.02	37.02	29.71	27.00	27.00	35.46
In[illegible]ticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.77	13.77	13.77	13.77	11.45	11.45	14.72
Total Material Costs (MA)	97.90	97.90	83.26	83.26	115.34	126.33	113.66	138.22	81.93	81.92	81.93	99.80	90.60	90.60	90.60	96.17	108.45	108.45	128.80
Total Costs (TC)	189.50	174.60	229.64	157.55	229.10	239.02	250.10	234.74	230.61	214.40	196.53	196.76	320.30	307.35	302.11	259.89	205.88	204.48	242.58
Total Hours	0.84	0.67	0.53	0.36	0.72	0.49	1.70	0.84	1.30	1.08	1.13	0.70	1.73	1.74	1.69	0.87	0.89	0.84	0.91
Yield	117.30	114.40	98.20	95.40	134.00	151.00	141.00	130.10	107.80	101.00	99.00	101.00	127.00	118.20	129.30	112.60	113.00	110.00	121.30
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	381.23	371.80	319.15	310.05	435.50	490.75	458.25	422.83	350.35	328.25	321.75	328.25	412.75	384.15	420.23	365.95	367.25	357.50	394.23
Margin A: Revenue - TC	191.72	197.20	89.51	152.50	206.32	251.73	208.15	188.08	119.74	113.85	125.22	131.49	92.45	76.80	118.11	106.06	161.37	153.02	151.65
Margin B: Revenue - MA	283.25	273.82	235.89	226.79	320.16	364.42	344.59	284.61	268.42	246.33	239.82	228.37	322.07	293.47	329.55	269.78	258.80	249.05	265.43
Margin C: Revenue - (MA + LC)	274.85	267.12	230.59	223.19	312.96	359.52	327.59	276.21	255.42	235.53	230.52	221.37	304.77	276.07	312.65	261.80	249.90	240.65	256.32

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN I 2000 PARTICIPANTS, 1986 BY
USING PURCHASE RATE PRICE FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS													
	96	97	98	99	100	101	102	103	104	105	106	107	108	109
	2-87	1-88	2 88	1 89	2-89	2 89	3 89	1-86	2 86	2 86	1 88	3 88	1 89	3 89
Operations Costs:														
Cost of Fall Operations	0.00	11.43	2.97	84.40	49.73	2.22	2.22	16.89	0.00	16.89	16.90	16.90	9.59	0.00
Cost of Spring Operations	49.82	29.14	35.11	71.68	87.99	21.99	19.90	34.74	40.58	40.80	28.34	30.89	22.59	28.32
Cost of Harvest Operations	65.11	57.94	48.13	70.22	61.61	31.68	31.68	76.72	79.58	81.22	53.62	58.89	83.02	78.51
Total Costs of Operations	114.93	98.51	86.21	226.30	199.33	55.89	53.80	128.34	120.17	138.90	98.86	105.80	115.20	106.83
- Fuel Costs	2.59	3.25	2.73	7.11	7.22	0.40	0.47	2.32	1.82	2.59	2.08	2.17	2.62	1.82
- Labour Costs (LC)	9.90	11.50	9.60	33.20	31.20	6.70	5.30	13.70	10.90	15.20	15.70	16.30	13.60	15.20
Material Costs:														
Seed	24.57	32.02	32.02	30.00	30.00	36.65	36.65	26.89	26.89	26.89	26.25	26.25	25.85	25.80
Fertilizer	54.05	45.60	45.60	75.50	75.50	79.67	79.67	31.91	31.91	31.91	51.94	51.94	60.04	59.23
Herbicide	35.46	23.35	23.35	20.50	20.50	43.14	43.14	7.60	7.60	7.60	19.19	4.00	0.00	0.00
Insecticide	14.72	14.72	14.72	14.00	14.00	0.00	0.00	12.00	12.00	12.00	0.44	0.44	0.00	0.00
Total Material Costs (MA)	128.80	115.77	115.77	140.00	140.00	159.46	159.46	78.40	78.40	78.40	97.82	82.63	85.89	85.03
Total Costs (TC)	243.73	214.28	201.98	374.46	347.41	215.35	213.26	206.74	198.57	217.30	196.68	188.51	201.09	191.86
Total Hours	0.99	1.15	0.96	3.32	3.12	0.67	0.53	1.37	1.09	1.52	1.57	1.63	1.28	1.44
Yield	118.70	109.50	85.10	104.40	91.10	85.00	93.90	99.60	106.00	102.70	83.00	95.00	112.00	102.00
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	385.70	355.88	276.58	339.30	296.08	276.25	305.18	323.70	344.50	333.78	269.75	308.75	364.00	331.50
Margin A: Revenue - TC	142.05	141.60	74.59	-35.16	-51.33	60.90	91.92	116.96	145.93	116.47	73.07	120.24	162.91	139.64
Margin B: Revenue - MA	256.90	240.11	160.81	199.22	148.08	116.79	145.72	245.30	266.10	255.38	171.93	226.12	278.11	246.47
Margin C: Revenue - (MA + LC)	247.00	228.61	151.21	158.02	116.88	110.09	140.42	231.60	255.20	240.18	156.23	209.82	264.51	231.27

NOTES:
Under each field number is the tillage type (1-conventional, 2 reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986 89
USING PURCHASE RATE PRICE FOR MACHINERY
(Dollars per Acre)

	CORN													
	AVG 1	AVG 2	AVG 3	AVG1 86	AVG2 86	AVG3 86	AVG1 87	AVG2 87	AVG3 87	AVG1 88	AVG2 88	AVG3 88	AVG1 89	AVG2 89	AVG3 89
Operations Costs:															
Cost of Fall Operations	21.87	10.94	1.32	19.51	12.24	1.29	18.63	13.25	1.64	16.74	3.95	2.41	30.13	11.06	0.22
Cost of Spring Operations	46.62	43.41	31.21	37.44	35.07	20.62	46.18	30.20	34.61	42.59	44.75	41.71	60.74	59.75	26.49
Cost of Harvest Operations	79.93	79.28	77.91	71.07	77.63	74.05	87.53	85.32	91.58	74.92	66.89	66.37	80.63	81.48	73.26
Total Costs of Operations	147.63	133.63	110.44	128.02	124.94	95.96	152.34	136.77	127.83	134.24	115.59	110.49	171.51	152.28	99.97
- Fuel Costs	2.30	1.84	1.20	2.10	1.50	0.55	1.90	1.37	1.03	1.81	1.44	0.98	3.94	3.07	1.94
- Labour Costs (LC)	13.66	10.51	7.74	12.23	10.00	5.00	12.60	11.33	9.32	11.94	8.17	8.09	18.33	11.51	6.92
Material Costs:															
Seed	29.17	29.10	29.93	29.23	28.64	28.26	28.39	27.52	28.96	29.56	30.87	29.77	30.18	30.95	32.12
Fertilizer	51.25	51.63	54.04	42.77	43.50	56.42	50.66	50.01	51.79	52.45	46.54	40.64	61.09	67.20	64.48
Herbicide	23.55	25.51	20.04	20.09	22.25	27.49	20.23	27.04	31.10	15.91	26.40	22.24	24.03	25.56	31.79
Insecticide	3.28	3.45	1.55	5.04	3.98	4.77	2.60	3.16	1.32	3.03	5.43	0.82	2.05	1.82	0.39
Total Material Costs (MA)	107.25	109.76	114.63	97.92	98.37	116.93	109.88	108.53	113.99	101.76	109.24	93.46	117.35	125.53	128.78
Total Costs (TC)	254.88	243.39	225.08	225.95	223.31	212.89	262.22	245.30	241.83	236.00	224.83	203.96	288.85	277.81	228.75
Total Hours	1.36	1.06	0.77	1.22	1.03	0.58	1.26	1.13	0.93	1.19	0.82	0.81	1.82	1.15	0.68
Yield	121.51	117.21	118.12	100.50	100.90	106.70	136.60	137.50	130.74	101.46	101.70	90.56	124.71	109.44	121.50
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	394.92	380.95	383.88	352.62	354.20	346.70	444.19	447.13	450.89	329.75	330.53	294.31	405.32	355.68	395.14
Margin A: Revenue - TC	140.04	137.55	158.80	126.68	130.89	133.80	181.98	201.83	209.07	93.75	105.69	90.35	116.47	77.87	166.38
Margin B: Revenue - MA	287.66	271.18	269.25	254.70	255.83	229.84	334.32	338.60	336.90	227.99	221.28	200.85	287.97	230.15	266.35
Margin C: Revenue - (MA + LC)	274.01	260.67	261.51	242.40	245.74	224.84	321.72	327.27	327.58	216.05	213.11	192.76	269.64	218.64	259.43

NOTES:
Total Costs (TC) = total variable costs + machinery/tractor costs only
AVG 1 = The mean result for conventional-tillage fields, 1986-89
AVG 2 = The mean result for reduced-tillage fields, 1986 89
AVG 3 = The mean result for no-till fields, 1986-89

ANNEX 6.1b

COMPARISON OF PRODUCTION COSTS AND NET RETURNS FOR GRAIN CORN, USING TRADE-IN VALUE FOR MACHINERY

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986 89
USING TRADE-IN FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	1-87	2-87	1-87	3-87	1-88	3-88	1-86	2-86	3-86	1-87	2-87	3-87	1-88	3-88	2-86	3-86	2-87	3-87	2-88
Operations Costs:																			
Cost of Fall Operations	8.73	7.21	13.66	0.00	30.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.66
Cost of Spring Operations	14.44	12.66	46.73	26.79	25.68	99.14	61.39	38.14	13.58	81.18	22.91	19.74	81.94	33.31	31.75	21.36	51.81	27.25	24.22
Cost of Harvest Operations	55.02	53.80	89.17	135.75	102.43	67.97	82.66	80.76	78.59	84.45	71.37	74.64	66.43	73.81	87.55	89.78	69.80	74.57	69.63
Total Costs of Operations	78.20	73.67	149.56	162.54	158.33	167.11	144.05	118.90	92.17	165.63	94.28	94.38	148.37	107.12	119.30	111.14	120.81	101.82	99.51
- Fuel Costs	2.61	2.06	1.96	0.82	1.48	0.84	0.57	0.48	0.18	1.89	0.56	0.52	0.89	0.73	0.89	0.28	0.28	0.00	1.22
- Labour Costs (LC)	10.80	9.20	17.00	9.00	13.00	9.50	8.50	7.00	5.00	9.00	5.50	4.50	11.70	8.20	9.30	5.00	9.00	7.00	10.30
Material Costs:																			
Seed	27.48	27.48	30.38	30.38	26.14	26.14	33.32	33.32	33.32	33.32	33.32	33.32	32.90	32.90	27.37	27.37	27.31	27.31	26.20
Fertilizer	43.26	40.25	43.80	43.80	50.00	50.00	81.87	81.87	81.87	49.80	49.80	49.80	35.71	35.71	75.87	75.87	56.21	56.21	40.31
Herbicide	32.10	32.10	13.60	13.60	5.00	5.00	20.37	20.37	20.37	22.30	30.50	35.00	0.00	24.47	21.70	20.45	13.45	13.45	11.31
Insecticide	1.00	1.00	0.00	0.00	4.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30
Total Material Costs (MA)	103.84	100.83	87.78	87.78	93.14	93.14	135.56	135.56	135.56	105.50	113.62	118.12	68.61	93.08	124.94	131.69	96.97	96.97	79.12
Total Costs (TC)	182.04	174.50	237.34	250.32	251.47	260.25	279.61	254.46	227.73	271.13	207.90	212.50	216.98	200.20	244.24	242.83	217.78	198.79	178.63
Total Hours	1.08	0.92	1.70	0.90	1.30	0.95	0.85	0.70	0.50	0.90	0.55	0.45	1.17	0.82	0.93	0.50	0.90	0.70	1.03
Yield	87.00	86.00	113.20	113.30	104.00	91.00	133.30	132.30	127.50	130.20	111.80	134.80	89.20	105.90	136.20	141.30	109.30	120.40	109.20
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	282.75	279.50	367.90	368.23	338.00	295.75	433.23	429.98	414.38	423.15	363.35	438.10	289.90	344.18	442.65	459.23	355.23	391.30	354.90
Margin A: Revenue - TC	100.71	105.00	130.56	117.91	86.53	35.50	153.62	175.52	186.65	152.02	155.45	225.60	72.92	143.98	198.41	216.40	137.45	192.51	176.27
Margin B: Revenue - MA	178.91	178.67	280.12	280.45	244.86	202.61	297.67	294.42	278.82	317.65	249.73	319.98	221.29	251.10	317.71	327.54	258.26	294.33	275.78
Margin C: Revenue - (MA + LC)	168.11	169.47	263.12	271.45	231.86	193.11	289.17	287.42	273.82	308.65	244.23	315.48	289.59	242.90	308.41	322.54	249.26	287.33	265.48

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3-no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986 89
USING TRADE-IN FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																	
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
	3-88	2-89	3-89	2-86	3-86	2-89	3-89	1-86	2-86	2-88	3-88	1-87	2-87	2 87	3-87	1 86	3 86	1-87	3 87
Operations Costs:																			
Cost of Fall Operations	0.00	0.00	0.00	12.56	5.60	12.00	0.00	12.61	9.48	0.00	0.00	9.35	0.00	0.99	0.00	13.02	0.00	6.85	0.00
Cost of Spring Operations	20.99	33.00	27.58	20.93	14.55	25.50	23.50	11.39	11.39	37.10	10.10	27.30	29.76	29.76	10.29	20.94	24.51	65.30	02.95
Cost of Harvest Operations	60.46	63.50	71.13	79.70	76.50	05.12	03.36	51.09	57.00	66.12	67.61	73.24	74.24	75.22	73.30	40.00	34.90	69.52	67.04
Total Costs of Operations	97.45	96.50	90.71	113.19	96.73	122.62	106.06	75.09	77.07	103.22	05.79	109.97	104.00	113.97	91.67	90.76	59.41	141.75	149.99
- Fuel Costs	0.56	0.04	0.20	0.70	0.00	0.00	0.00	0.00	1.04	0.36	0.36	1.53	1.32	1.56	1.09	2.20	1.40	3.60	3.76
- Labour Costs (LC)	7.00	6.00	6.00	5.00	2.30	0.00	0.00	7.00	9.00	5.50	3.00	15.40	14.30	16.00	12.70	13.90	9.30	19.00	21.50
Material Costs:																			
Seed	26.20	20.10	20.10	30.00	30.00	30.00	30.00	33.60	33.60	40.00	40.00	20.37	20.37	20.37	20.37	26.65	26.65	36.00	36.00
Fertilizer	40.06	114.00	114.00	49.24	49.36	40.00	40.00	27.00	27.00	31.56	31.56	63.90	63.90	63.90	63.90	37.42	43.03	06.95	06.95
Herbicide	11.31	12.63	12.63	26.92	26.92	25.70	25.70	10.00	10.00	46.70	49.50	35.72	35.72	35.72	57.44	10.30	10.30	23.06	23.06
Insecticide	1.30	3.90	3.90	12.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.60	16.60	0.75	0.75
Total Material Costs (MA)	79.67	159.51	159.51	110.16	110.20	111.70	111.70	70.60	70.60	110.34	121.14	120.07	120.07	120.07	149.79	90.97	104.50	147.56	147.56
Total Costs (TC)	177.12	256.09	250.22	231.35	215.01	234.32	210.56	153.69	156.47	221.56	206.93	230.04	232.07	242.04	241.46	109.73	163.99	209.31	297.55
Total Hours	0.70	0.60	0.60	0.50	0.23	0.00	0.00	0.70	0.90	0.55	0.30	1.54	1.43	1.60	1.27	1.39	0.93	1.90	2.15
Yield	102.00	99.30	116.60	115.30	100.40	146.60	140.10	112.00	97.00	59.50	64.50	131.70	134.20	132.70	120.30	74.00	54.00	127.10	140.70
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	331.50	322.73	370.95	374.73	352.30	476.45	401.33	364.00	317.05	193.30	209.63	420.03	436.15	431.20	416.90	240.50	175.50	413.00	457.20
Margin A: Revenue - TC	154.30	66.63	120.73	143.30	137.29	242.13	262.77	210.31	161.30	-20.19	2.69	109.90	204.00	109.24	175.51	50.77	11.51	123.77	159.73
Margin B: Revenue - MA	251.03	163.22	219.44	256.56	230.02	364.75	369.63	205.40	239.25	75.04	00.49	299.96	300.00	303.21	267.19	141.53	70.92	265.52	309.72
Margin C: Revenue - (MA + LC)	244.03	157.22	213.44	251.56	231.72	364.75	369.63	270.40	230.25	69.54	05.49	204.55	293.70	207.21	254.49	127.63	61.62	246.52	200.22

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986 BY
USING TRADE-IN PRICE FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																	
	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
	1-86	2-86	1-89	2-89	2-88	3-88	2-89	3-89	1 87	2-87	3 87	3 87	1 89	2 89	3 89	3 89	1-89	2 89	2 89
Operations Costs:																			
Cost of Fall Operations	33.61	12.59	23.50	12.23	0.00	0.00	0.00	0.00	14.19	5.10	0.00	0.00	18.38	1.30	0.00	0.00	15.70	12.38	0.00
Cost of Spring Operations	31.20	37.06	95.02	94.87	46.81	39.83	36.08	33.87	19.69	19.88	19.16	37.19	41.60	32.55	18.48	30.92	59.50	50.97	65.24
Cost of Harvest Operations	53.52	54.04	70.54	71.19	56.61	55.44	55.51	54.07	78.19	80.57	91.97	80.57	72.47	69.38	65.18	67.10	89.67	84.57	86.04
Total Costs of Operations	118.33	103.69	189.06	178.30	103.42	95.27	91.59	87.94	112.07	105.55	111.12	117.76	132.45	103.23	83.65	98.09	164.87	147.91	151.28
- Fuel Costs	4.56	3.14	3.88	3.31	1.55	1.31	5.97	10.50	2.10	1.49	1.03	1.65	3.37	1.77	1.04	1.46	5.10	2.94	4.10
- Labour Costs (LC)	19.00	13.10	19.40	17.50	10.20	9.00	7.30	6.10	9.60	7.60	14.10	8.90	12.30	10.30	6.40	8.50	16.50	11.60	11.60
Material Costs:																			
Seed	28.89	28.89	32.40	32.40	28.80	28.80	36.53	36.53	31.62	31.62	31.62	31.62	33.00	33.00	33.00	33.00	24.91	24.91	24.91
Fertilizer	44.36	44.36	55.39	55.39	35.56	35.56	34.10	34.10	33.46	33.46	33.46	33.46	65.29	65.29	65.29	65.29	59.43	66.43	66.43
Herbicide	18.63	18.63	13.92	13.92	36.89	36.89	30.86	30.86	25.70	25.70	36.27	25.70	41.70	41.70	41.70	41.70	20.85	19.70	19.70	19.70
Insecticide	0.26	0.26	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	92.14	92.14	101.96	101.96	101.33	101.33	101.49	101.49	90.78	90.78	101.35	90.78	139.99	139.99	139.99	119.14	104.84	111.04	111.04
Total Costs (TC)	210.47	195.83	291.02	280.26	204.75	196.60	193.08	189.43	202.85	196.33	212.47	208.54	272.44	243.22	223.64	217.23	268.91	258.95	262.32
Total Hours	1.90	1.31	1.94	1.75	1.02	0.90	0.73	0.61	0.96	0.76	1.41	0.89	1.23	1.03	0.64	0.85	1.65	1.16	1.16
Yield	103.00	91.00	122.30	123.40	83.00	80.10	94.90	91.90	170.00	175.90	176.00	182.00	170.10	161.20	150.00	154.90	113.90	91.00	90.00
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	334.75	295.75	397.48	401.05	269.75	260.33	308.43	298.68	552.50	571.68	572.00	591.50	552.82	523.90	487.50	503.43	370.18	296.35	292.50
Margin A: Revenue - TC	124.28	99.92	106.46	120.79	65.00	63.72	115.35	109.25	349.65	375.35	359.53	382.96	280.39	280.68	263.86	286.19	101.27	39.40	30.18
Margin B: Revenue - MA	242.61	203.61	295.52	299.09	168.42	159.00	206.94	197.19	461.72	480.90	470.65	500.72	412.83	383.91	347.51	384.29	266.14	187.31	181.46
Margin C: Revenue - (MA + LC)	223.61	190.51	276.12	281.59	158.22	150.00	199.64	191.09	452.12	473.30	456.55	491.82	400.53	373.61	341.11	375.79	249.64	175.71	169.86

NOTES:
Under each field number is the tillage type (1-conventional, 2 reduced-till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN I-2000 PARTICIPANTS, 1986 89
USING TRADE-IN PRICE FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																	
	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
	2-89	3-89	1-89	3-87	1-87	2-87	1-87	2-87	3-87	1-86	2-86	1-87	2-87	2-87	1-88	2-88	2-88	2-86	3-86
Operations Costs:																			
Cost of Fall Operations	15.80	0.00	11.80	0.00	27.70	27.70	23.94	22.67	11.64	21.06	41.62	8.47	9.81	6.88	8.55	6.94	9.81	7.03	1.31
Cost of Spring Operations	47.34	27.22	20.51	8.67	45.35	46.44	38.85	38.85	34.19	23.05	22.54	20.15	20.15	33.70	26.24	26.24	26.24	37.63	17.95
Cost of Harvest Operations	125.48	83.64	54.14	66.22	75.30	72.94	97.59	93.68	88.59	79.54	76.76	83.64	86.90	90.02	75.26	75.26	72.00	67.48	70.58
Total Costs of Operations	188.62	110.85	86.45	74.89	148.44	147.16	160.38	155.20	134.42	123.65	140.92	120.26	124.85	130.60	110.05	108.44	108.05	112.14	89.84
- Fuel Costs	4.10	1.82	2.17	0.82	3.34	3.24	1.66	1.38	0.82	1.52	1.47	1.26	1.33	1.32	1.34	1.22	1.34	1.42	0.62
- Labour Costs (LC)	12.90	7.20	16.30	6.10	20.30	19.80	8.70	7.30	4.50	13.80	14.80	7.80	9.10	8.20	7.80	7.20	9.10	8.20	6.20
Material Costs:																			
Seed	24.91	24.91	32.00	32.00	26.33	26.33	20.90	20.90	20.90	31.50	31.50	30.60	30.60	30.60	30.50	30.50	30.50	27.19	27.19
Fertilizer	66.43	66.43	59.60	59.60	5.27	5.27	88.29	88.29	88.29	59.64	59.64	84.44	84.44	84.44	70.91	70.91	70.91	42.34	52.40
Herbicide	19.70	54.11	36.22	36.22	22.73	22.73	22.90	22.90	22.90	18.20	18.20	17.70	17.70	17.70	32.03	21.02	21.03	23.06	31.94
Insecticide	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00	11.00	0.00	0.00
Total Material Costs (MA)	111.04	145.45	127.82	127.82	55.33	55.33	132.09	132.09	141.09	109.34	109.34	132.74	132.74	132.74	133.44	133.43	133.44	92.59	111.61
Total Costs (TC)	299.66	256.30	214.27	202.71	203.77	202.49	292.47	287.29	275.51	232.99	250.26	253.00	257.59	263.34	243.49	241.87	241.49	204.73	201.45
Total Hours	1.29	0.72	1.63	0.61	2.03	1.98	0.87	0.73	0.45	1.38	1.48	0.70	0.91	0.82	0.78	0.72	0.91	0.82	0.62
Yield	111.10	87.80	109.30	140.50	139.40	133.30	182.90	177.20	152.60	125.30	113.50	176.30	191.60	190.60	121.60	142.40	134.50	103.00	108.00
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	361.00	285.35	355.23	456.63	453.05	433.23	594.43	575.90	495.95	407.23	368.88	572.98	622.70	619.45	395.20	462.80	437.13	334.75	351.00
Margin A: Revenue - TC	61.42	29.05	140.96	253.92	249.28	230.73	301.96	288.61	220.44	174.24	118.62	319.98	365.11	356.11	151.71	220.93	195.64	130.02	149.55
Margin B: Revenue - MA	250.04	139.90	227.41	328.81	397.72	377.90	462.34	443.81	354.86	297.89	259.54	440.24	489.96	486.71	261.76	329.37	303.69	242.16	239.39
Margin C: Revenue - (MA + LC)	237.14	132.70	211.11	322.71	377.42	358.10	453.64	436.51	350.36	284.09	244.74	432.44	480.86	478.51	253.96	322.17	294.59	233.96	233.19

NOTES:
Under each field number is the tillage type (1-conventional, 2 reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN T-2000 PARTICIPANTS, 1986-89
USING TRADE-IN PRICE FOR MACHINERY
(Dollars per Acre)

	CORN FIELDS																	
	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	2-87	3-87	2-88	3-88	1-87	3-87	1-89	3-89	1 86	2-86	2-86	3 86	1 87	2 87	2 87	3 87	1 86	2-86	1 87
Operations Costs:																			
Cost of Fall Operations	0.22	2.50	0.00	0.00	4.86	0.00	16.14	0.00	9.91	6.22	6.22	0.00	29.34	28.69	24.68	0.00	5.07	0.00	9.03
Cost of Spring Operations	13.47	12.77	47.24	7.69	14.42	12.80	25.41	12.23	50.60	42.22	25.96	22.59	46.86	40.54	45.40	27.70	22.59	22.59	28.61
Cost of Harvest Operations	42.57	41.79	50.25	50.09	88.39	97.52	75.86	74.88	66.34	63.69	63.04	59.36	117.37	113.30	107.62	104.52	55.56	59.67	55.85
Total Costs of Operations	64.26	57.06	97.50	57.78	107.66	110.32	117.42	87.10	126.85	112.13	95.22	81.95	192.77	182.52	177.70	132.22	83.22	82.26	92.70
- Fuel Costs	1.24	1.04	1.68	0.86	0.87	0.39	3.25	1.30	2.05	1.51	1.41	0.83	0.68	0.62	0.28	0.19	2.70	2.56	2.16
- Labour Costs (LC)	0.40	6.70	5.30	3.60	7.20	4.90	17.00	0.40	13.00	10.80	9.30	7.00	17.30	17.40	16.90	8.70	8.90	8.40	9.10
Material Costs:																			
Seed	20.00	20.00	20.00	20.00	27.10	27.10	33.09	33.09	25.00	25.00	25.00	25.00	23.91	23.91	23.91	23.91	28.00	28.00	24.57
Fertilizer	45.50	45.50	30.84	30.84	39.39	39.38	52.41	52.41	17.95	17.95	17.95	35.90	15.10	15.10	15.10	28.78	42.00	42.00	54.05
Herbicide	24.40	24.40	24.42	24.42	48.77	59.77	28.16	52.72	38.98	38.97	38.98	38.90	37.82	37.82	37.82	29.71	27.00	27.00	35.46
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.77	13.77	13.77	13.77	11.45	11.45	14.72
Total Material Costs (MA)	97.90	97.90	83.26	83.26	115.34	126.33	113.66	138.22	81.93	81.92	81.93	99.80	90.60	90.60	90.60	96.17	108.45	108.45	128.80
Total Costs (IC)	162.24	155.04	180.76	141.04	223.00	236.65	231.08	225.32	208.78	194.05	177.15	181.83	283.45	273.20	268.38	228.39	191.67	190.71	221.50
Total Hours	0.84	0.67	0.53	0.36	0.72	0.49	1.70	0.84	1.30	1.08	1.13	0.70	1.73	1.74	1.69	0.87	0.89	0.84	0.91
Yield	117.30	114.40	98.20	95.40	134.00	151.00	141.00	130.10	107.80	101.00	99.00	101.00	127.00	118.20	129.30	112.60	113.00	110.00	121.30
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	381.23	371.80	319.15	310.05	435.50	490.75	458.25	422.83	350.35	328.25	321.75	328.25	412.75	384.15	420.23	365.95	367.25	357.50	394.23
Margin A: Revenue - IC	218.98	216.76	138.39	169.01	212.50	254.10	227.17	197.50	141.57	134.20	144.60	146.42	129.30	110.95	151.84	137.56	175.58	166.79	172.73
Margin B: Revenue - MA	283.25	273.82	235.89	226.79	320.16	364.42	344.59	284.61	268.42	246.33	239.82	228.37	322.07	293.47	329.55	269.78	258.80	249.05	265.43
Margin C: Revenue - (MA + LC)	274.85	267.12	230.59	223.19	312.96	359.52	327.59	276.21	255.42	235.53	230.52	221.37	304.77	276.07	312.65	261.08	249.90	240.65	256.32

NOTES:
Under each field number is the tillage type (1-conventional, 2 reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR CORN I 2000 PARTICIPANTS, 1986 89
USING TRADE-IN PRICE FOR MACHINERY
(Dollars per Acre)

	CORN														
	AVG 1	AVG 2	AVG 3	AVG1 86	AVG2 86	AVG3 86	AVG1 87	AVG2 87	AVG3 87	AVG1 88	AVG2 88	AVG3 88	AVG1 89	AVG2 89	AVG3 89
Operations Costs:															
Cost of Fall Operations	14.75	8.72	1.17	13.39	8.97	1.15	13.02	10.72	1.29	12.68	3.61	2.39	20.73	9.22	0.21
Cost of Spring Operations	38.05	35.19	26.93	32.12	29.55	19.09	38.02	32.27	28.98	36.83	33.74	36.45	45.73	47.07	22.72
Cost of Harvest Operations	72.62	71.97	71.89	64.88	70.60	68.30	80.58	77.81	84.58	68.65	61.57	62.29	71.57	72.70	66.79
Total Costs of Operations	125.41	115.88	99.99	109.59	109.12	88.54	131.61	120.80	114.85	118.15	98.92	101.13	138.03	128.99	89.72
- Fuel Costs	2.38	1.84	1.20	2.10	1.50	0.55	1.90	1.37	1.03	1.81	1.44	0.98	3.94	3.07	1.94
- Labour Costs (LC)	13.66	10.51	7.74	12.23	10.08	5.80	12.60	11.33	9.32	11.94	8.17	8.09	18.33	11.51	6.92
Material Costs:															
Seed	29.17	29.18	29.93	29.23	28.64	28.26	28.39	27.52	28.96	29.56	30.87	29.77	30.18	30.95	32.12
Fertilizer	51.25	51.63	54.84	42.77	43.50	56.42	50.66	50.81	51.79	52.45	46.54	40.64	61.89	67.20	64.48
Herbicide	23.55	25.51	20.84	20.89	22.25	27.49	20.23	27.84	31.10	15.91	26.40	22.24	24.83	25.56	31.79
Insecticide	3.28	3.45	1.55	5.84	3.98	4.77	2.68	3.16	1.32	3.83	5.43	0.82	2.05	1.82	0.39
Total Material Costs (MA)	107.25	109.76	114.63	97.92	98.37	116.93	109.88	108.53	113.99	101.76	109.24	93.46	117.35	125.53	128.78
Total Costs (TC)	232.66	225.65	214.62	207.51	207.49	205.47	241.49	229.32	228.84	219.91	208.16	194.59	255.38	254.53	218.50
Total Hours	1.36	1.06	0.77	1.22	1.03	0.58	1.26	1.13	0.93	1.19	0.82	0.81	1.82	1.15	0.68
Yield	121.51	117.21	110.12	108.50	108.98	106.70	136.68	137.58	130.74	101.46	101.70	90.56	124.71	109.44	121.58
Crop Price	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25
Total Crop Revenue	394.92	380.95	383.88	352.62	354.20	346.78	444.19	447.13	450.89	329.75	330.53	294.31	405.32	355.68	395.14
Margin A: Revenue - TC	162.25	155.30	169.26	145.11	146.70	141.30	202.70	217.81	222.05	109.84	122.36	99.72	149.94	101.15	176.63
Margin B: Revenue - MA	287.66	271.18	269.25	254.70	255.83	229.84	334.32	338.60	336.90	227.99	221.28	200.85	287.97	230.15	266.35
Margin C: Revenue - (MA + LC)	274.01	260.67	261.51	242.48	245.74	224.04	321.72	327.27	327.58	216.05	213.11	192.76	269.64	218.64	259.43

NOTES:
Total Costs (TC) = total variable costs + machinery/tractor costs only
AVG 1 = The mean result for conventional-tillage fields, 1986-89
AVG 2 = The mean result for reduced tillage fields, 1986 89
AVG 3 = The mean result for no-till fields, 1986 89

ANNEX 6.2a

COMPARISON OF PRODUCTION COSTS AND NET RETURNS FOR SOYBEANS, USING PURCHASE PRICE FOR MACHINERY

COMPARISON OF PRODUCTION COSTS
FOR SOYBEAN T-2000 PARTICIPANTS, 1986 88
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

	SOYBEAN FIELDS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	2-87	3-87	1-86	2-86	2-86	3-86	1-88	2-88	2 88	3-88	1 87	2 87	1 86	3 86	1 86	2 86	2 86	3 86	1 88
Operations Costs:																			
Cost of Fall Operations	34.50	11.91	0.00	10.87	0.00	22.46	61.00	12.66	0.00	13.27	7.51	7.51	0.00	30.88	14.03	12.40	0.00	0.00	0.00
Cost of Spring Operations	87.69	23.60	15.40	26.58	26.00	37.63	36.69	37.63	26.60	15.65	15.65	15.65	37.42	76.03	54.96	34.65	30.16	46.34	39.38
Cost of Harvest Operations	58.73	58.29	58.51	36.84	35.82	14.85	16.09	14.52	13.96	22.57	22.31	22.46	20.65	26.52	26.12	55.50	54.03	56.54	54.96
Total Costs of Operations	180.92	93.80	73.90	73.49	61.82	74.94	113.78	64.81	40.56	51.49	45.47	45.62	58.08	134.23	95.11	102.55	84.19	102.88	94.34
- Fuel Costs	5.90	2.36	1.34	0.67	0.00	0.78	0.98	0.78	0.47	0.98	0.98	0.98	0.92	2.65	1.71	1.47	1.00	1.48	1.00
- Labour Costs (LC)	18.00	11.10	6.70	2.00	0.00	9.00	11.50	9.00	5.40	12.00	12.00	12.00	9.00	15.20	10.40	9.50	7.40	9.40	7.00
Material Costs:																			
Seed	35.70	35.70	35.70	31.35	31.35	25.89	25.89	25.89	25.89	22.51	22.51	22.51	22.51	30.64	30.64	32.07	32.07	32.12	32.12
Fertilizer	17.86	17.86	17.86	13.10	13.10	14.76	14.76	14.76	14.80	0.00	0.00	0.00	0.00	0.00	0.00	6.36	6.36	0.00	0.00
Herbicide	16.27	16.27	29.33	29.25	29.25	45.11	45.11	45.11	72.87	24.54	24.54	24.54	45.28	15.79	15.79	55.62	55.62	25.46	42.46
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.70	0.00	0.00	0.00	0.00
Total Material Costs (MA)	69.83	69.83	82.89	73.70	73.70	85.76	85.76	85.76	113.56	47.05	47.05	47.05	67.79	47.13	47.13	94.05	94.05	57.58	74.58
Total Costs (TC)	250.75	163.63	156.79	147.19	135.52	160.70	199.54	150.57	154.12	98.54	92.52	92.67	125.87	181.36	142.24	196.60	178.24	160.46	168.92
Total Hours	1.82	1.11	0.61	0.28	0.00	0.90	1.15	0.90	0.54	1.20	1.20	1.20	0.90	1.52	1.04	0.95	0.74	0.94	0.70
Yield	16.40	13.20	14.80	41.10	35.60	34.40	34.80	30.10	30.50	37.80	36.20	37.10	26.00	52.70	50.70	37.00	35.10	39.50	36.60
Crop Price	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Total Crop Revenue	116.44	93.72	105.08	291.81	252.76	244.24	247.08	213.71	216.55	268.38	257.02	263.41	184.60	374.17	359.97	262.70	249.21	280.45	259.86
Margin A: Revenue - TC	-134.31	-69.91	-51.71	144.62	117.24	83.54	47.54	63.14	62.43	169.84	164.50	170.74	58.73	192.81	217.73	66.10	70.97	119.99	90.94
Margin B: Revenue - MA	46.61	23.89	22.19	218.11	179.06	158.48	161.32	127.95	102.99	221.33	209.97	216.36	116.81	327.04	312.84	168.65	155.16	222.87	185.28
Margin C: Revenue - (MA + LC)	28.61	12.79	16.09	215.31	179.06	149.48	149.82	118.95	97.59	209.33	197.97	204.36	107.81	311.84	302.44	159.15	147.76	213.47	178.28

NOTES:
Under each field number is the tillage type (1 conventional, 2 reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR SOYBEAN I-2000 PARTICIPANTS, 1986 88
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

	SOYBEAN FIELDS																	
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
	2-88	2-88	3-88	1-88	2-88	2-88	2-88	3-88	1 88	3-88	1 88	2 88	2-88	1 87	2 87	1 88	3 88	1 88	2 88
Operations Costs:																			
Cost of Fall Operations	29.80	5.29	0.00	0.00	18.50	4.89	0.00	0.00	38.91	0.00	9.02	13.70	0.00	24.87	0.00	10.77	10.64	0.00	17.47
Cost of Spring Operations	28.60	29.20	17.34	18.90	20.50	20.50	19.69	36.63	46.60	85.11	56.53	57.69	81.65	34.75	24.94	26.82	19.04	26.99	52.85
Cost of Harvest Operations	27.72	31.25	30.71	31.54	35.14	32.12	61.53	36.22	50.90	54.46	48.94	53.32	49.79	10.48	10.48	37.90	38.14	38.96	26.77
Total Costs of Operations	86.20	65.82	48.05	50.52	74.30	57.59	81.22	72.85	136.57	139.57	114.49	124.71	131.44	70.10	35.42	75.57	67.82	65.95	97.10
- Fuel Costs	1.99	1.51	0.80	0.70	1.60	1.05	0.64	1.12	3.55	2.00	2.65	2.35	2.45	2.10	0.76	1.76	1.31	0.89	1.40
- Labour Costs (LC)	10.40	8.40	5.80	8.00	8.50	6.40	7.70	8.20	22.50	10.30	20.00	22.70	20.00	16.70	8.10	12.90	10.40	9.10	11.00
Material Costs:																			
Seed	17.97	17.97	17.97	17.97	12.32	13.34	13.24	13.24	13.29	13.29	13.29	13.29	13.29	22.65	22.65	27.27	27.27	27.27	25.00
Fertilizer	18.37	18.37	18.37	18.37	27.32	27.54	27.11	27.11	0.00	0.00	0.00	0.00	0.00	0.00	15.60	12.00	12.00	0.00	9.77
Herbicide	31.38	31.38	89.86	31.38	41.41	41.73	74.85	69.67	34.94	34.94	34.94	34.94	90.36	31.50	31.50	48.33	48.33	58.33	41.00
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	67.72	67.72	126.20	67.72	81.05	82.61	115.20	110.02	48.23	48.23	48.23	48.23	103.65	54.23	69.91	87.60	87.60	85.60	75.77
Total Costs (TC)	153.92	133.54	174.25	118.24	155.35	140.20	196.42	182.87	184.80	187.80	162.72	172.94	235.09	124.33	105.33	163.17	155.42	151.55	172.87
Total Hours	1.04	0.84	0.58	0.80	0.85	0.64	0.77	0.82	2.25	1.83	2.00	2.27	2.08	1.67	0.81	1.29	1.04	0.91	1.10
Yield	56.60	43.60	42.50	36.50	46.50	49.60	34.30	41.60	39.40	33.10	26.90	29.30	7.30	28.00	35.40	28.00	29.00	34.00	34.70
Crop Price	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Total Crop Revenue	401.86	309.56	301.75	259.15	330.15	352.16	243.53	295.36	279.74	235.01	190.99	208.03	51.83	198.80	251.34	198.80	205.90	241.40	246.37
Margin A: Revenue - TC	247.94	176.02	127.50	140.91	174.80	211.96	47.11	112.49	94.94	47.21	28.27	35.09	-183.26	74.47	146.01	35.63	50.48	89.85	73.50
Margin B: Revenue - MA	334.14	241.84	175.55	191.43	249.10	269.55	128.33	185.34	231.51	186.78	142.76	159.80	-51.82	144.57	181.43	111.20	118.30	155.80	170.60
Margin C: Revenue - (MA + LC)	323.74	233.44	169.75	183.43	240.60	263.15	120.63	177.14	209.01	168.48	122.76	137.10	72.62	127.87	173.33	98.30	107.90	146.70	159.60

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced-till, 3 no-till), and year

COMPARISON OF PRODUCTION COSTS
FOR SOYBEAN T-2000 PARTICIPANTS, 1986 88
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

	SOYBEAN FIELDS						
	39	40	41	42	43	44	45
Operations Costs:							
Cost of Fall Operations	11.90	0.40	36.79	21.67	5.00	7.03	21.75
Cost of Spring Operations	46.46	38.11	43.50	43.50	52.20	22.82	13.25
Cost of Harvest Operations	26.13	26.05	47.10	46.74	45.66	76.52	96.83
Total Costs of Operations	84.49	64.56	127.39	111.91	102.94	106.37	131.83
- Fuel Costs	1.12	0.54	1.80	1.53	0.95	1.29	0.95
- Labour Costs (LC)	8.00	5.80	8.70	7.00	7.40	15.30	17.90
Material Costs:							
Seed	25.00	25.00	21.50	21.59	21.63	30.90	30.90
Fertilizer	9.77	9.77	41.12	41.13	41.12	17.00	17.00
Herbicide	41.00	41.00	28.10	28.10	44.79	38.79	38.79
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	75.77	75.77	90.00	90.90	107.54	96.32	96.32
Total Costs (TC)	160.26	140.33	218.27	202.81	210.48	202.69	228.15
Total Hours	0.00	0.87	0.87	0.70	0.74	1.53	1.79
Yield	30.00	29.70	44.10	35.30	41.90	53.00	53.00
Crop Price	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Total Crop Revenue	213.00	210.87	313.11	250.63	297.49	376.30	376.30
Margin A: Revenue - TC	52.74	70.54	94.84	47.82	87.01	173.61	148.15
Margin B: Revenue - MA	137.23	135.10	222.23	159.73	189.95	279.98	279.98
Margin C: Revenue - (MA + LC)	128.43	129.30	213.53	152.73	182.55	264.68	262.00

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3-no till), and year

COMPARISON OF PRODUCTION COSTS
FOR SOYBEAN T-2000 PARTICIPANTS, 1986 88
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

	SOYBEAN FIELDS											
	AVG 1	AVG 2	AVG 3	AVG1 86	AVG2 86	AVG3 86	AVG1 87	AVG2 87	AVG3 87	AVG1 88	AVG2 88	AVG3 88
Operations Costs:												
Cost of Fall Operations	21.28	12.12	0.35	26.13	22.84	0.00	18.96	9.17	0.00	21.70	9.17	0.56
Cost of Spring Operations	37.93	37.99	35.97	33.15	34.56	23.27	49.82	42.71	41.72	29.87	40.76	40.86
Cost of Harvest Operations	43.89	43.88	42.04	21.29	29.34	32.56	51.52	50.43	42.38	46.99	56.23	48.26
Total Costs of Operations	102.30	93.99	78.36	80.57	86.74	55.83	120.30	102.31	84.10	98.57	106.16	89.67
- Fuel Costs	1.86	1.37	0.87	1.38	1.18	0.76	1.97	1.38	0.87	1.74	1.48	0.95
- Labour Costs (LC)	12.14	11.37	8.05	9.70	9.60	6.65	15.25	13.10	9.27	13.34	12.82	9.60
Material Costs:												
Seed	27.02	27.02	27.74	21.93	25.46	23.40	30.77	31.27	31.61	24.78	20.36	23.60
Fertilizer	12.00	11.06	11.63	16.57	13.56	14.40	8.94	6.91	5.56	12.20	11.50	14.24
Herbicide	31.49	36.41	56.35	38.25	44.31	62.43	27.29	41.20	56.14	32.16	33.68	58.89
Insecticide	0.04	0.03	0.00	0.00	0.00	0.00	0.35	0.14	0.00	0.00	0.00	0.00
Total Material Costs (MA)	71.55	75.22	95.97	76.74	83.32	100.38	71.72	81.28	93.31	69.14	65.54	96.74
Total Costs (TC)	173.85	169.22	174.34	157.31	170.06	156.21	192.02	183.59	177.41	167.71	171.70	186.41
Total Hours	1.21	1.14	0.82	0.97	0.96	0.67	1.53	1.31	0.93	1.33	1.28	0.96
Yield	40.10	36.89	33.47	45.50	36.38	36.15	52.85	44.00	37.07	38.20	36.34	33.20
Crop Price	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Total Crop Revenue	284.71	261.90	237.62	323.05	258.26	256.67	375.24	312.40	263.17	271.22	258.01	235.72
Margin A: Revenue - TC	110.86	92.69	63.29	165.74	88.20	100.45	183.21	128.81	85.76	103.51	86.31	49.31
Margin B: Revenue - MA	213.16	186.68	141.65	246.31	174.94	156.28	303.51	231.12	169.86	202.08	192.47	138.98
Margin C: Revenue - (MA + LC)	201.02	175.31	133.60	236.61	165.34	149.63	288.26	218.02	160.59	188.74	179.65	129.38

NOTES:
Total Costs (TC) = total variable costs + machinery/tractor costs only
AVG 1 = The mean result for conventional-tillage fields, 1986-88
AVG 2 = The mean result for reduced-tillage fields, 1986 88
AVG 3 = The mean result for no-till fields, 1986-88

ANNEX 6.2b

COMPARISON OF PRODUCTION COSTS AND NET RETURNS FOR SOYBEANS, USING TRADE-IN VALUE FOR MACHINERY

COMPARISON OF PRODUCTION COSTS
FOR SOYBEAN I-2000 PARTICIPANTS, 1986 88
USING TRADE-IN VALUE FOR MACHINERY
(Dollars per Acre)

	SOYBEAN FIELDS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	2-87	3-87	1-86	2-86	2-86	3-86	1-88	2-88	2 88	3-88	1 87	2 87	1 86	3-86	1 86	2 86	2 86	3 86	1 88
Operations Costs:																			
Cost of Fall Operations	16.49	10.64	0.00	7.06	0.00	9.25	28.35	8.89	0.00	5.50	5.29	5.29	0.00	25.28	12.34	8.81	0.00	0.00	0.00
Cost of Spring Operations	75.23	20.68	13.13	24.85	26.00	26.81	25.41	26.81	20.25	13.98	13.98	13.98	23.21	62.67	43.79	23.45	21.11	35.78	34.64
Cost of Harvest Operations	54.86	54.42	54.64	36.84	35.82	14.44	15.68	14.11	13.55	21.37	21.11	21.26	19.45	18.52	18.12	38.82	36.55	39.07	37.49
Total Costs of Operations	146.58	85.74	67.76	68.75	61.82	50.50	69.44	49.81	33.80	40.85	40.38	40.53	42.67	106.47	74.25	70.28	57.66	74.85	72.13
- Fuel Costs	5.90	2.36	1.34	0.67	0.00	0.78	0.98	0.78	0.47	0.98	0.98	0.98	0.92	2.65	1.71	1.47	1.00	1.40	1.00
- Labour Costs (LC)	10.00	11.10	6.10	2.00	0.00	9.00	11.50	9.00	5.40	12.00	12.00	12.00	9.00	15.20	10.40	9.50	7.40	9.40	7.00
Material Costs:																			
Seed	35.70	35.70	35.70	31.35	31.35	25.89	25.89	25.89	25.89	22.51	22.51	22.51	22.51	30.64	30.64	32.07	32.07	32.12	32.12
Fertilizer	17.86	17.86	17.86	13.10	13.10	14.76	14.76	14.76	14.80	0.00	0.00	0.00	0.00	0.00	0.00	6.36	6.36	0.00	0.00
Herbicide	16.27	16.27	29.33	29.25	29.25	45.11	45.11	45.11	72.07	24.54	24.54	24.54	45.20	15.79	15.79	55.62	55.62	25.46	42.46
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.70	0.00	0.00	0.00	0.00
Total Material Costs (MA)	69.83	69.83	82.89	73.70	73.70	85.76	85.76	85.76	113.56	47.05	47.05	47.05	67.79	47.13	47.13	94.05	94.05	57.58	74.58
Total Costs (TC)	216.41	155.57	150.65	142.45	135.52	136.26	155.20	135.57	147.36	87.90	87.43	87.58	110.46	153.60	121.38	164.33	151.71	132.43	146.71
Total Hours	1.82	1.11	0.61	0.20	0.00	0.90	1.15	0.90	0.54	1.20	1.20	1.20	0.90	1.52	1.04	0.95	0.74	0.94	0.70
Yield	16.40	13.20	14.80	41.10	35.60	34.40	34.80	30.10	30.50	37.80	36.20	37.10	26.80	52.70	50.70	37.00	35.10	39.50	36.60
Crop Price	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Total Crop Revenue	116.44	93.72	105.08	291.81	252.76	244.24	247.08	213.71	216.55	268.38	257.02	263.41	184.60	374.17	359.97	262.70	249.21	280.45	259.86
Margin A: Revenue - TC	-99.97	-61.85	-45.57	149.36	117.24	107.98	91.88	78.14	69.19	180.48	169.59	175.83	74.14	220.57	238.59	98.37	97.50	148.02	113.15
Margin B: Revenue - MA	46.61	23.89	22.19	218.11	179.06	158.48	161.32	127.95	102.99	221.33	209.97	216.36	116.81	327.04	312.84	168.65	155.16	222.87	185.28
Margin C: Revenue - (MA + LC)	28.61	12.79	16.09	215.31	179.06	149.48	149.82	118.95	97.59	209.33	197.97	204.36	107.81	311.84	302.44	159.15	147.76	213.47	178.28

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3-no till), and year

COMPARISON OF PRODUCTION COSTS
FOR SOYBEAN T-2000 PARTICIPANTS, 1986 88
USING TRADE-IN VALUE FOR MACHINERY
(Dollars per Acre)

	SOYBEAN FIELDS																	
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
	2-88	2-88	3-88	1-88	2-88	2 88	2-88	3-88	1 88	3 88	1 88	2 88	2 88	1 87	2 87	1 88	3 88	1-88	2 88
Operations Costs:																			
Cost of Fall Operations	21.17	5.12	0.00	0.00	16.84	4.72	0.00	0.00	30.60	0.00	8.42	13.70	0.00	11.80	0.00	8.14	8.57	0.00	14.74
Cost of Spring Operations	22.70	24.10	12.94	14.78	14.07	14.07	13.28	28.91	34.63	62.51	43.28	43.77	58.03	19.67	14.29	22.42	15.28	24.28	34.50
Cost of Harvest Operations	20.35	23.80	23.34	24.17	25.74	22.72	52.13	26.82	39.23	42.71	37.19	41.57	38.04	4.45	4.45	34.45	34.61	35.43	24.44
Total Costs of Operations	64.22	53.18	36.28	38.95	56.65	41.51	65.41	55.73	104.46	105.22	88.89	99.04	96.07	35.92	18.74	65.01	58.46	59.71	73.77
- Fuel Costs	1.99	1.51	0.00	0.78	1.60	1.05	0.64	1.12	3.55	2.00	2.65	2.35	2.45	2.10	0.76	1.76	1.31	0.89	1.40
- Labour Costs (LC)	10.40	0.40	5.00	0.00	8.50	6.40	7.70	0.20	22.50	10.30	20.00	22.70	20.80	16.70	8.10	12.90	10.40	9.10	11.00
Material Costs:																			
Seed	17.97	17.97	17.97	17.97	12.32	13.34	13.24	13.24	13.29	13.29	13.29	13.29	13.29	22.65	22.65	27.27	27.27	27.27	25.00
Fertilizer	18.37	18.37	18.37	18.37	27.32	27.54	27.11	27.11	0.00	0.00	0.00	0.00	0.00	0.00	15.68	12.00	12.00	0.00	9.77
Herbicide	31.38	31.38	89.86	31.38	41.41	41.73	74.85	69.67	34.94	34.94	34.94	34.94	90.36	31.50	31.50	48.33	48.33	58.33	41.00
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	67.72	67.72	126.20	67.72	81.05	82.61	115.20	110.02	48.23	48.23	48.23	48.23	103.65	54.23	69.91	87.60	87.60	85.60	75.77
Total Costs (TC)	131.94	120.90	162.48	106.67	137.70	124.12	180.61	165.75	152.69	153.45	137.12	147.27	199.72	90.15	88.65	152.61	146.06	145.31	149.54
Total Hours	1.04	0.84	0.58	0.80	0.85	0.64	0.77	0.82	2.25	1.83	2.00	2.27	2.00	1.67	0.81	1.29	1.04	0.91	1.10
Yield	56.60	43.60	42.50	36.50	46.50	49.60	34.30	41.60	39.40	33.10	26.90	29.30	7.30	28.00	35.40	28.00	29.00	34.00	34.70
Crop Price	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Total Crop Revenue	401.86	309.56	301.75	259.15	330.15	352.16	243.53	295.36	279.74	235.01	190.99	208.03	51.83	198.80	251.34	198.80	205.90	241.40	246.37
Margin A: Revenue - TC	269.92	188.66	139.27	152.48	192.45	228.04	62.92	129.61	127.05	81.56	53.87	60.76	-147.89	108.65	162.69	46.19	59.84	96.09	96.83
Margin B: Revenue - MA	334.14	241.84	175.55	191.43	249.10	269.55	128.33	185.34	231.51	186.78	142.76	159.80	-51.82	144.57	181.43	111.20	118.30	155.80	170.60
Margin C: Revenue - (MA + LC)	323.74	233.44	169.75	183.43	240.60	263.15	128.63	177.14	209.01	168.48	122.76	137.10	72.62	127.87	173.33	98.30	107.90	146.70	159.60

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR SOYBEAN I-2000 PARTICIPANTS, 1986 HB
USING TRADE-IN VALUE FOR MACHINERY
(Dollars per Acre)

	SOYBEAN FIELDS						
	39	40	41	42	43	44	45
Operations Costs:							
Cost of Fall Operations	10.67	0.40	22.60	16.61	5.00	6.85	21.75
Cost of Spring Operations	29.50	23.03	35.13	35.13	24.03	21.65	11.96
Cost of Harvest Operations	23.80	23.72	20.86	20.50	19.42	55.32	75.63
Total Costs of Operations	64.05	47.15	78.67	72.24	49.25	83.82	109.34
- Fuel Costs	1.12	0.54	1.80	1.53	0.95	1.29	0.95
- Labour Costs (LC)	8.80	5.80	8.70	7.80	7.40	15.30	17.90
Material Costs:							
Seed	25.00	25.00	21.58	21.59	21.63	30.90	30.90
Fertilizer	9.77	9.77	41.12	41.13	41.12	17.80	17.80
Herbicide	41.00	41.00	28.10	28.18	44.79	38.79	38.79
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	75.77	75.77	90.80	90.90	107.54	96.32	96.32
Total Costs (TC)	139.82	122.92	169.55	163.14	156.79	180.14	205.66
Total Hours	0.88	0.87	0.87	0.70	0.74	1.53	1.79
Yield	30.00	29.70	44.10	35.30	41.90	53.00	53.00
Crop Price	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Total Crop Revenue	213.00	210.87	313.11	250.63	297.49	376.30	376.30
Margin A: Revenue - TC	73.18	87.95	143.56	87.49	140.70	196.16	170.64
Margin B: Revenue - MA	137.23	135.10	222.23	159.73	189.95	279.98	279.98
Margin C: Revenue - (MA + LC)	128.43	129.30	213.53	152.73	182.55	264.68	262.08

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3-no till), and year

COMPARISON OF PRODUCTION COSTS
FOR SOYBEAN T-2000 PARTICIPANTS, 1986 88
USING TRADE IN VALUE FOR MACHINERY
(Dollars per Acre)

	SOYBEAN FIELDS											
	AVG 1	AVG 2	AVG 3	AVG1 86	AVG2 86	AVG3 86	AVG1 87	AVG2 87	AVG3 87	AVG1 88	AVG2 88	AVG3 88
Operations Costs:												
Cost of Fall Operations	15.60	8.85	0.35	15.21	12.79	0.00	16.07	8.23	0.00	14.68	7.62	0.56
Cost of Spring Operations	31.07	29.90	27.47	24.75	24.96	17.27	42.16	36.71	38.77	23.08	31.80	28.62
Cost of Harvest Operations	34.29	34.16	33.47	17.40	22.92	24.40	36.92	41.10	36.56	34.08	41.11	35.74
Total Costs of Operations	80.96	72.92	61.29	57.36	60.68	41.67	95.14	86.03	75.33	71.84	80.54	64.92
- Fuel Costs	1.86	1.37	0.87	1.38	1.18	0.76	1.97	1.38	0.87	1.74	1.48	0.95
- Labour Costs (LC)	12.14	11.37	8.65	9.70	9.60	6.65	15.25	13.10	9.27	13.34	12.02	9.60
Material Costs:												
Seed	27.02	27.02	27.74	21.93	25.46	23.48	30.77	31.27	31.61	24.70	20.36	23.60
Fertilizer	12.00	11.06	11.63	16.57	13.56	14.48	8.94	6.91	5.56	12.20	11.50	14.24
Herbicide	31.49	36.41	56.35	38.25	44.31	62.43	27.29	41.20	56.14	32.16	33.68	58.89
Insecticide	0.04	0.03	0.00	0.00	0.00	0.00	0.35	0.14	0.00	0.00	0.00	0.00
Total Material Costs (MA)	71.55	75.22	95.97	76.74	83.32	100.38	71.72	81.28	93.31	69.14	65.54	96.74
Total Costs (TC)	152.51	148.14	157.26	134.10	144.00	142.05	166.87	167.31	168.64	140.98	146.08	161.65
Total Hours	1.21	1.14	0.82	0.97	0.96	0.67	1.53	1.31	0.93	1.33	1.28	0.96
Yield	40.10	36.89	33.47	45.50	36.38	36.15	52.85	44.00	37.87	38.20	36.34	33.20
Crop Price	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Total Crop Revenue	284.71	261.90	237.62	323.05	258.26	256.67	375.24	312.40	263.17	271.22	258.01	235.72
Margin A: Revenue - TC	132.20	113.76	80.36	188.95	114.26	114.61	208.37	145.09	94.53	130.24	111.93	74.07
Margin B: Revenue - MA	213.16	186.68	141.65	246.31	174.94	156.28	303.51	231.12	169.86	202.08	192.47	138.98
Margin C: Revenue - (MA + LC)	201.02	175.31	133.68	236.61	165.34	149.63	288.26	218.02	160.59	188.74	179.65	129.38

NOTES:
Total Costs (TC) = total variable costs + machinery/tractor costs only
AVG 1 = The mean result for conventional-tillage fields, 1986-88
AVG 2 = The mean result for reduced-tillage fields, 1986 88
AVG 3 = The mean result for no-till fields, 1986 88

ANNEX 6.3a

COMPARISON OF PRODUCTION COSTS AND NET RETURNS FOR SPRING GRAINS, USING PURCHASE PRICE FOR MACHINERY

COMPARISON OF PRODUCTION COSTS
FOR SPRING GRAINS 1-2000 PARTICIPANTS, 1986 89
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

	SPRING GRAIN FIELDS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	1-86	2-86	1-89	3-89	1-87	2-87	1-88	2-88	2-88	3-88	3-88	2-89	3-89	2-87	3-87	2-89	3-89	1-87	3-87
Operations Costs:																			
Cost of Fall Operations	9.99	0.00	13.31	0.00	14.69	5.11	35.76	10.92	0.00	0.00	0.00	3.30	0.00	28.82	26.82	24.20	1.70	12.13	0.00
Cost of Spring Operations	18.87	27.63	26.16	16.22	22.41	25.78	21.35	21.35	50.39	30.86	35.86	48.96	45.45	27.27	19.29	27.82	24.82	21.30	13.86
Cost of Harvest Operations	32.69	32.46	11.64	21.00	44.82	44.14	16.89	15.70	39.50	29.34	31.86	30.14	25.60	33.82	28.84	28.83	22.20	12.44	10.93
Total Costs of Operations	60.75	60.09	51.11	37.22	81.92	75.03	74.00	48.05	89.89	60.20	66.92	82.40	71.05	89.11	74.15	80.85	47.92	45.86	23.99
- Fuel Costs	2.05	2.05	1.40	0.31	0.88	0.77	1.41	1.30	1.03	0.95	0.95	1.35	1.35	4.87	4.14	0.71	0.54	2.60	1.20
- Labour Costs (LC)	22.20	22.20	13.50	4.60	9.00	8.10	11.10	10.40	9.50	7.00	7.00	15.30	13.70	19.50	12.60	11.80	6.20	11.30	6.80
Material Costs:																			
Seed	10.10	10.10	1.26	1.26	23.84	23.84	21.69	21.69	6.81	6.81	6.81	21.13	22.89	16.25	16.25	39.47	39.47	29.95	29.95
Fertilizer	33.45	33.45	32.52	32.52	13.28	13.28	41.46	41.46	20.20	20.20	20.20	35.53	35.53	20.84	25.14	13.47	13.47	34.13	34.13
Herbicide	2.10	2.10	30.50	30.50	7.32	7.32	3.88	3.88	48.73	48.73	48.73	60.95	43.00	1.17	1.17	7.50	7.50	1.40	1.40
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	53.73	53.73	64.28	64.28	44.44	44.44	67.03	67.03	75.74	75.74	75.74	117.61	162.42	37.46	42.56	60.44	60.44	65.48	65.48
Total Costs (TC)	114.48	113.82	115.39	101.50	126.36	119.47	141.03	115.08	165.63	135.94	142.66	200.01	233.47	126.57	116.71	140.49	108.36	111.34	89.47
Total Hours	2.22	2.22	1.35	0.46	0.90	0.81	1.11	1.04	0.95	0.70	0.70	1.53	1.37	1.95	1.26	1.10	0.62	1.13	0.68
Yield	54.60	52.80	35.40	8.40	53.40	47.20	64.50	51.80	52.70	31.40	35.00	50.10	29.30	43.00	37.00	36.00	23.00	31.50	20.00
Crop Price	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Total Crop Revenue	147.42	142.56	95.58	22.68	144.18	127.44	174.15	139.86	142.29	84.78	94.50	135.27	79.11	116.10	99.90	97.20	62.10	85.05	54.00
Margin A: Revenue - TC	32.94	28.74	19.81	-78.82	17.82	7.97	33.12	24.78	-23.34	-51.16	-48.16	64.74	-154.36	-10.47	16.81	43.29	46.26	26.29	35.47
Margin B: Revenue - MA	93.69	88.83	31.30	-41.60	99.74	83.00	107.12	72.83	66.55	9.04	18.76	17.66	-83.31	78.64	57.34	36.76	1.66	19.57	11.48
Margin C: Revenue - (MA + LC)	71.49	66.63	17.80	-46.20	90.74	74.90	96.02	62.43	57.05	2.04	11.76	2.36	97.81	59.14	44.74	24.96	4.54	8.27	10.28

COMPARISON OF PRODUCTION COSTS
FOR SPRING GRAINS I-2000 PARTICIPANTS, 1986 89
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

	SPRING GRAIN FIELDS								
	1-86	2-86	1-89	3-89	1-87	2-87	1-88	2-88	2 88
	1-86	2-86	1-87	2-87	1-88	2-88	2-88	1-89	2-89
Operations Costs:									
Cost of Fall Operations	0.00	51.29	27.96	13.00	16.89	0.00	16.89	16.89	0.00
Cost of Spring Operations	20.50	15.65	45.13	40.62	22.83	28.67	22.83	30.15	0.03
Cost of Harvest Operations	34.56	34.95	47.42	47.12	29.30	29.92	28.13	35.52	15.27
Total Costs of Operations	55.06	101.89	120.51	100.74	69.01	58.59	67.84	82.55	23.30
- Fuel Costs	0.00	1.17	1.24	0.72	2.26	1.74	2.26	2.79	0.00
- Labour Costs (LC)	15.50	10.50	15.50	9.00	13.70	10.00	13.70	14.10	10.50
Material Costs:									
Seed	24.00	24.00	19.00	19.00	14.00	14.00	14.00	18.00	18.00
Fertilizer	24.50	24.50	8.50	8.50	28.26	28.26	28.26	36.86	36.86
Herbicide	6.00	6.00	22.50	22.50	2.00	2.00	2.00	8.00	8.00
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	54.50	54.50	50.00	50.00	44.26	44.26	44.26	62.86	62.86
Total Costs (TC)	109.56	156.39	170.51	150.74	113.27	102.85	112.10	145.41	86.16
Total Hours	1.55	1.05	1.55	0.90	1.37	1.00	1.37	1.41	1.05
Yield	38.30	41.40	49.20	46.80	42.90	33.90	47.60	76.90	77.80
Crop Price	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Total Crop Revenue	103.41	111.78	132.84	126.36	115.83	91.53	128.52	207.63	210.06
Margin A: Revenue - TC	-6.15	-44.61	37.67	-24.38	2.56	11.32	16.42	62.22	123.90
Margin B: Revenue - MA	48.91	57.28	82.84	76.36	71.57	47.27	84.26	144.77	147.20
Margin C: Revenue - (MA + LC)	33.41	46.78	67.34	67.36	57.87	36.47	70.56	130.67	136.70

NOTES:
Under each field number is the tillage type (1 conventional, 2 reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR WHEAT I-2000 PARTICIPANTS, 1986 89
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

SPRING GRAIN

	AVG 1	AVG 2	AVG 3
	AVG 1	AVG 2	AVG 3
Operations Costs:			
Cost of Fall Operations	16.40	12.79	4.07
Cost of Spring Operations	25.32	20.75	26.40
Cost of Harvest Operations	29.47	31.54	24.02
Total Costs of Operations	71.20	73.08	54.49
- Fuel Costs	1.63	1.50	1.36
- Labour Costs (LC)	13.99	12.61	8.27
Material Costs:			
Seed	18.87	19.69	17.63
Fertilizer	28.11	25.32	25.88
Herbicide	9.31	14.35	25.86
Insecticide	0.00	0.00	8.71
Total Material Costs (MA)	56.29	59.36	78.09
Total Costs (TC)	127.48	132.44	132.59
Total Hours	1.40	1.26	0.83
Yield	49.63	48.42	26.30
Crop Price	2.70	2.70	2.70
Total Crop Revenue	134.01	130.75	71.01
Margin A: Revenue - TC	6.53	-1.70	-61.58
Margin B: Revenue - MA	77.72	71.39	-7.08
Margin C: Revenue - (MA + LC)	63.73	58.78	15.36

NOTES:
Total Costs (TC) = total variable costs + machinery/tractor costs only
AVG 1 = The mean result for conventional-tillage fields, 1986-89
AVG 2 = The mean result for reduced tillage fields, 1986 89
AVG 3 = The mean result for no till fields, 1986 89

ANNEX 6.3b

COMPARISON OF PRODUCTION COSTS AND NET RETURNS FOR SPRING GRAINS, USING TRADE-IN VALUE FOR MACHINERY

COMPARISON OF PRODUCTION COSTS
FOR SPRING GRAINS I-2000 PARTICIPANTS, 1986 BY
USING TRADE IN PRICE FOR MACHINERY
(Dollars per Acre)

	SPRING GRAIN FIELDS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	1-86	2-86	1-89	3-89	1-87	2-87	1-88	2-88	2-88	3-88	3-88	2-89	3-89	2-87	3-87	2-89	3-89	1-87	3-87
Operations Costs:																			
Cost of Fall Operations	9.50	0.00	12.67	0.00	13.11	4.75	17.02	9.48	0.00	0.00	0.00	3.30	0.00	23.99	21.99	24.20	1.70	8.69	0.00
Cost of Spring Operations	16.55	25.39	23.60	14.95	21.21	24.25	17.79	17.79	42.79	26.24	31.24	39.17	39.50	26.75	19.16	26.46	21.77	16.20	11.23
Cost of Harvest Operations	28.87	28.64	11.64	21.00	44.02	44.14	13.71	12.60	36.97	26.81	28.53	26.30	21.76	31.23	26.91	26.85	22.20	10.60	9.09
Total Costs of Operations	54.92	54.03	47.91	35.95	79.14	73.14	48.52	39.87	79.76	53.05	59.77	68.77	61.26	81.97	68.06	77.51	45.67	35.48	20.32
- Fuel Costs	2.05	2.05	1.40	0.31	0.88	0.77	1.41	1.30	1.03	0.95	0.95	1.35	1.35	4.87	4.14	0.71	0.54	2.60	1.28
- Labour Costs (LC)	22.20	22.20	13.50	4.60	9.00	8.10	11.10	10.40	9.50	7.00	7.00	15.30	13.70	19.50	12.60	11.80	6.20	11.30	6.80
Material Costs:																			
Seed	10.10	10.10	1.26	1.26	23.84	23.84	21.69	21.69	6.81	6.81	6.81	21.13	22.89	16.25	16.25	39.47	39.47	29.95	29.95
Fertilizer	33.45	33.45	32.52	32.52	13.28	13.28	41.46	41.46	28.28	28.28	28.28	35.53	35.53	28.84	25.14	13.47	13.47	34.13	34.13
Herbicide	2.10	2.10	30.50	30.50	7.32	7.32	3.88	3.88	48.73	48.73	48.73	60.95	43.00	1.17	1.17	7.50	7.50	1.40	1.40
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	53.73	53.73	64.28	64.28	44.44	44.44	67.03	67.03	75.74	75.74	75.74	117.61	162.42	37.46	42.56	60.44	60.44	65.48	65.48
Total Costs (TC)	108.65	107.76	112.19	100.23	123.58	117.58	115.55	106.90	155.50	128.79	135.51	186.38	223.68	119.43	110.62	137.95	106.11	100.96	85.80
Total Hours	2.22	2.22	1.35	0.46	0.90	0.81	1.11	1.04	0.95	0.70	0.70	1.53	1.37	1.95	1.26	1.10	0.62	1.13	0.68
Yield	54.60	52.80	35.40	8.40	53.40	47.20	64.50	51.80	52.70	31.40	35.00	50.10	29.30	43.00	37.00	36.00	23.00	31.50	20.00
Crop Price	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Total Crop Revenue	147.42	142.56	95.58	22.68	144.18	127.44	174.15	139.86	142.29	84.78	94.50	135.27	79.11	116.10	99.90	97.20	62.10	85.05	54.00
Margin A: Revenue - TC	38.77	34.80	-16.61	-77.55	20.60	9.86	58.60	32.96	-13.21	-44.01	-41.01	-51.11	144.57	-3.33	-10.72	-40.75	-44.01	-15.91	31.80
Margin B: Revenue - MA	93.69	88.83	31.30	-41.60	99.74	83.00	107.12	72.83	66.55	9.04	18.76	17.66	-83.31	78.64	57.34	36.76	1.66	19.57	11.48
Margin C: Revenue - (MA + LC)	71.49	66.63	17.80	-46.20	90.74	74.90	96.02	62.43	57.05	2.04	11.76	2.36	97.01	59.14	44.74	24.96	4.54	8.27	18.28

COMPARISON OF PRODUCTION COSTS
FOR SPRING GRAINS I-2000 PARTICIPANTS, 1986 89
USING TRADE IN PRICE FOR MACHINERY
(Dollars per Acre)

	SPRING GRAIN FIELDS								
	1-86	2-86	1-89	3-89	1-87	2-87	1-88	2-88	2-88
	1-86	2-86	1-87	2-87	1-88	2-88	2-88	1-89	2-89
Operations Costs:									
Cost of Fall Operations	0.00	41.49	17.79	13.00	11.00	0.00	11.00	11.00	0.00
Cost of Spring Operations	20.50	10.31	33.09	29.20	10.02	22.94	10.02	23.68	8.03
Cost of Harvest Operations	34.56	34.95	47.42	47.12	27.70	28.32	26.53	33.92	15.27
Total Costs of Operations	55.06	86.75	98.30	89.32	50.39	51.26	57.22	69.47	23.30
- Fuel Costs	0.00	1.17	1.24	0.72	2.26	1.74	2.26	2.79	0.00
- Labour Costs (LC)	15.50	10.50	15.50	9.00	13.70	10.00	13.70	14.10	10.50
Material Costs:									
Seed	24.00	24.00	19.00	19.00	14.00	14.00	14.00	18.00	18.00
Fertilizer	24.50	24.50	8.50	8.50	28.26	28.26	28.26	36.86	36.86
Herbicide	6.00	6.00	22.50	22.50	2.00	2.00	2.00	8.00	8.00
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	54.50	54.50	50.00	50.00	44.26	44.26	44.26	62.86	62.86
Total Costs (TC)	109.56	141.25	148.30	139.32	102.65	95.52	101.48	132.33	86.16
Total Hours	1.55	1.05	1.55	0.90	1.37	1.00	1.37	1.41	1.05
Yield	30.30	41.40	49.20	46.00	42.90	33.90	47.60	76.90	77.00
Crop Price	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Total Crop Revenue	103.41	111.70	132.84	126.36	115.83	91.53	128.52	207.63	210.06
Margin A: Revenue - TC	-6.15	-29.47	-15.46	-12.96	13.10	-3.99	27.04	75.30	123.90
Margin B: Revenue - MA	48.91	57.20	82.84	76.36	71.57	47.27	84.26	144.77	147.20
Margin C: Revenue - (MA + LC)	33.41	46.70	67.34	67.36	57.07	36.47	70.56	130.67	136.70

NOTES:
Under each field number is the tillage type (1 conventional, 2 reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR WHEAT I-2000 PARTICIPANTS, 1986-89
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

SPRING GRAIN

	AVG 1	AVG 2	AVG 3
	AVG 1	AVG 2	AVG 3
Operations Costs:			
Cost of Fall Operations	11.39	11.01	3.30
Cost of Spring Operations	21.27	24.32	23.44
Cost of Harvest Operations	28.14	29.91	22.33
Total Costs of Operations	60.80	65.24	49.15
- Fuel Costs	1.63	1.50	1.36
- Labour Costs (LC)	13.99	12.61	8.27
Material Costs:			
Seed	10.87	19.69	17.63
Fertilizer	20.11	25.32	25.88
Herbicide	9.31	14.35	25.86
Insecticide	0.00	0.00	8.71
Total Material Costs (MA)	56.29	59.36	78.09
Total Costs (TC)	117.09	124.60	127.25
Total Hours	1.40	1.26	0.83
Yield	49.63	48.42	26.30
Crop Price	2.70	2.70	2.70
Total Crop Revenue	134.01	130.75	71.01
Margin A: Revenue - TC	16.92	6.14	-56.24
Margin B: Revenue - MA	77.72	71.39	-7.08
Margin C: Revenue - (MA + LC)	63.73	58.78	-15.36

NOTES:
Total Costs (TC) = total variable costs + machinery/tractor costs only
AVG 1 = The mean result for conventional-tillage fields, 1986-89
AVG 2 = The mean result for reduced-tillage fields, 1986-89
AVG 3 = The mean result for no-till fields, 1986-89

ANNEX 6.4a

COMPARISON OF PRODUCTION COSTS AND NET RETURNS FOR WHEAT, USING PURCHASE PRICE FOR MACHINERY

COMPARISON OF PRODUCTION COSTS
FOR WHEAT I-2000 PARTICIPANTS, 1986-89
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

	WHEAT FIELDS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	1-88	2-88	3-88	1-88	2-88	3-88	1-89	2-89	2 88	3-88	1 89	2 89	2-89	3 89	2 88	3 88	1 86	2 86	3 86
Operations Costs:																			
Cost of Fall Operations	27.93	16.49	0.92	0.45	0.45	0.45	10.32	9.62	36.87	26.36	14.28	10.98	14.28	0.01	6.60	5.20	3.45	1.75	2.45
Cost of Spring Operations	6.10	6.10	0.21	30.83	37.93	7.42	0.59	0.59	10.20	10.20	7.91	7.91	7.91	7.91	26.89	26.89	26.10	26.10	44.00
Cost of Harvest Operations	28.65	30.12	20.70	19.21	9.17	6.60	16.67	17.16	31.95	31.30	26.46	24.90	25.59	23.90	26.17	26.22	35.40	35.37	35.26
Total Costs of Operations	62.76	52.80	37.91	50.49	47.55	14.55	35.50	35.37	87.10	75.94	48.65	43.87	47.70	39.83	59.65	50.30	65.11	63.30	81.71
- Fuel Costs	3.17	2.25	1.54	2.00	2.00	0.59	0.03	0.03	1.05	1.50	1.00	1.13	1.13	0.07	1.27	1.27	0.63	0.63	0.70
- Labour Costs (LC)	10.00	10.00	4.70	14.00	13.90	4.70	10.90	10.20	15.60	12.20	17.30	14.00	17.30	14.00	7.70	6.30	5.00	3.30	4.50
Material Costs:																			
Seed	15.00	15.00	15.00	10.10	10.10	10.10	21.00	21.00	45.00	45.00	0.00	40.24	40.24	40.24	26.60	26.60	57.70	57.70	57.70
Fertilizer	42.42	42.42	42.42	23.40	23.40	23.40	42.10	42.10	36.06	36.06	0.00	70.44	70.44	70.44	36.06	36.06	124.22	124.22	124.22
Herbicide	4.30	4.30	4.30	21.22	21.22	21.22	0.00	0.00	1.20	19.20	0.00	0.00	0.00	0.00	2.21	2.21	0.00	0.00	0.00
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	61.80	61.80	61.80	62.80	62.80	62.80	63.90	63.90	82.26	100.26	0.00	110.68	110.68	110.68	64.95	64.95	181.92	181.92	181.92
Total Costs (TC)	124.56	114.60	99.71	113.29	110.35	77.35	99.40	99.27	169.36	176.20	48.65	154.55	158.46	150.51	124.60	123.25	247.03	245.22	263.63
Total Hours	1.00	1.00	0.47	1.40	1.39	0.47	0.95	0.00	1.56	1.22	1.73	1.40	1.73	1.40	0.77	0.93	0.33	0.20	0.45
Yield	26.90	38.90	40.80	10.20	5.60	10.10	70.90	81.50	57.00	53.00	91.00	87.30	91.10	80.70	50.50	50.00	75.00	74.00	73.00
Crop Price	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
Total Crop Revenue	102.22	147.02	155.04	69.16	21.28	38.38	299.02	309.70	216.60	201.40	348.04	331.74	346.18	306.66	191.90	193.04	285.00	281.20	277.40
Margin A: Revenue - TC	-22.34	33.22	55.33	-44.13	-89.07	-38.97	200.34	210.43	47.24	25.20	300.19	177.19	187.72	156.15	67.30	69.79	37.97	35.98	13.77
Margin B: Revenue - MA	40.42	86.02	93.24	6.36	-41.52	-24.42	235.92	245.80	134.34	101.14	348.04	221.06	235.50	195.98	126.95	128.09	103.08	99.28	95.40
Margin C: Revenue - (MA + LC)	29.62	76.02	88.54	-7.64	-55.42	-29.12	225.02	235.60	118.74	88.94	331.54	207.06	218.20	181.98	119.25	121.79	98.08	95.98	90.90

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced till, 3-no till), and year

COMPARISON OF PRODUCTION COSTS
FOR WHEAT T-2000 PARTICIPANTS, 1986 89
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

	WHEAT FIELDS									
	20	21	22	23	24	25	26	27	28	29
	2-89	3-89	2-88	3 88	1 86	3 86	1-88	3-88	2 88	3 88
Operations Costs:										
Cost of Fall Operations	15.86	5.45	7.03	1.54	5.85	2.95	68.50	1.56	3.75	0.45
Cost of Spring Operations	20.67	13.37	15.53	25.00	7.00	15.80	12.06	12.06	22.43	21.23
Cost of Harvest Operations	38.76	38.70	55.70	56.62	35.62	36.60	36.53	36.20	37.15	36.77
Total Costs of Operations	83.29	57.52	78.26	83.16	48.47	55.35	117.10	49.82	63.34	58.45
- Fuel Costs	0.76	0.53	1.33	1.10	0.45	0.93	1.85	0.77	0.67	0.53
- Labour Costs (LC)	3.50	1.70	8.50	8.50	6.40	6.00	10.40	3.70	4.70	3.40
Material Costs:										
Seed	34.75	34.75	30.90	30.89	46.09	46.09	19.54	19.54	30.41	30.41
Fertilizer	73.64	73.64	39.79	39.79	119.97	120.43	20.98	20.98	46.27	46.27
Herbicide	7.41	25.41	2.26	2.27	0.00	0.00	31.40	31.40	4.20	4.20
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	115.80	133.80	80.95	80.95	166.06	166.52	79.92	79.92	80.88	80.88
Total Costs (TC)	199.09	191.32	159.21	164.11	214.53	221.87	197.02	129.74	144.22	139.33
Total Hours	0.35	0.17	0.85	0.85	0.64	0.60	1.84	0.37	0.47	0.34
Yield	61.50	62.90	62.50	60.10	65.00	71.00	40.00	30.00	42.40	42.80
Crop Price	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
Total Crop Revenue	233.70	239.02	237.50	258.78	247.00	269.80	152.00	144.40	161.12	162.64
Margin A: Revenue - TC	34.61	47.70	78.29	94.67	32.47	47.93	-45.02	14.66	16.90	23.31
Margin B: Revenue - MA	117.90	105.22	156.55	177.83	80.94	103.28	72.08	64.48	80.24	81.76
Margin C: Revenue - (MA + LC)	114.40	103.52	148.05	169.33	74.54	97.28	53.68	60.78	75.54	78.36

NOTES:
Under each field number is the tillage type (1-conventional, 2 reduced till, 3 no till), and year

COMPARISON OF PRODUCTION COSTS
FOR WHEAT I-2000 PARTICIPANTS, 1986 89
USING PURCHASE PRICE FOR MACHINERY
(Dollars per Acre)

WHEAT

	AVG 1	AVG 2	AVG 3
	AVG 1	AVG 2	AVG 3
Operations Costs:			
Cost of Fall Operations	10.68	11.24	10.99
Cost of Spring Operations	14.11	10.77	17.86
Cost of Harvest Operations	20.37	30.19	32.45
Total Costs of Operations	61.17	60.21	61.30
- Fuel Costs	1.54	1.26	1.04
- Labour Costs (LC)	11.03	9.80	7.46
Material Costs:			
Seed	25.47	33.54	31.45
Fertilizer	54.44	54.99	50.02
Herbicide	8.14	3.90	12.80
Insecticide	0.00	0.00	0.00
Total Material Costs (MA)	88.06	92.42	94.35
Total Costs (TC)	149.22	152.63	155.65
Total Hours	1.14	0.96	0.77
Yield	56.54	59.30	50.93
Crop Price	3.80	3.80	3.80
Total Crop Revenue	214.86	225.34	193.52
Margin A: Revenue - TC	65.64	72.71	37.87
Margin B: Revenue - MA	126.81	132.92	99.17
Margin C: Revenue - (MA + LC)	114.98	123.04	91.71

NOTES:
Total Costs (TC) = total variable costs + machinery/tractor costs only
AVG 1 = The mean result for conventional-tillage fields, 1986-88
AVG 2 = The mean result for reduced-tillage fields, 1986-88
AVG 3 = The mean result for no till fields, 1986-88

ANNEX 6.4b

COMPARISON OF PRODUCTION COSTS AND NET RETURNS FOR WHEAT, USING TRADE-IN VALUE FOR MACHINERY

COMPARISON OF PRODUCTION COSTS
FOR WHEAT T-2000 PARTICIPANTS, 1986 89
USING TRADE-IN PRICE FOR MACHINERY
(Dollars per Acre)

	WHEAT FIELDS																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	1-88	2-88	3-88	1-88	2-88	3-88	1-89	2-89	2-88	3-88	1-89	2-89	2-89	3-89	2-88	3-88	1-86	2-86	3-86
Operations Costs:																			
Cost of Fall Operations	10.26	12.02	0.51	0.00	0.00	0.00	8.93	8.23	30.37	21.15	14.84	11.54	14.84	7.54	4.00	3.40	3.00	1.30	2.00
Cost of Spring Operations	5.36	5.36	6.97	28.05	35.82	6.92	7.73	7.73	18.00	18.00	6.00	6.00	6.00	6.00	20.25	20.25	15.20	15.20	30.50
Cost of Harvest Operations	22.07	23.54	22.20	18.14	8.10	5.61	16.67	17.16	31.02	30.37	25.67	24.19	24.00	23.11	10.17	10.22	35.40	35.37	35.26
Total Costs of Operations	45.69	40.93	29.68	46.19	43.92	12.53	33.33	33.12	79.47	69.60	46.59	41.81	45.72	36.74	43.29	41.94	53.76	51.95	75.84
- Fuel Costs	2.72	1.00	1.09	1.55	1.55	0.14	0.30	0.30	1.40	1.13	1.43	0.60	0.60	0.42	0.02	0.02	0.10	0.10	0.25
- Labour Costs (LC)	10.00	10.00	4.70	14.00	13.90	4.70	10.90	10.20	15.60	12.20	17.30	14.00	17.30	14.00	7.70	6.30	5.00	3.30	4.50
Material Costs:																			
Seed	15.00	15.00	15.00	10.10	10.10	10.10	21.00	21.00	45.00	45.00	0.00	40.24	40.24	40.24	26.60	26.60	57.70	57.70	57.70
Fertilizer	42.42	42.42	42.42	23.40	23.40	23.40	42.10	42.10	36.06	36.06	0.00	70.44	70.44	70.44	36.06	36.06	124.22	124.22	124.22
Herbicide	4.30	4.30	4.30	21.22	21.22	21.22	0.00	0.00	1.20	19.20	0.00	0.00	0.00	0.00	2.21	2.21	0.00	0.00	0.00
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	61.80	61.80	61.80	62.80	62.80	62.80	63.90	63.90	82.26	100.26	0.00	110.68	110.68	110.68	64.95	64.95	181.92	181.92	181.92
Total Costs (TC)	107.49	102.73	91.48	108.99	106.72	75.33	97.23	97.02	161.73	169.86	46.59	152.49	156.40	147.42	108.24	106.89	235.68	233.87	257.76
Total Hours	1.00	1.00	0.47	1.40	1.39	0.47	0.95	0.80	1.56	1.22	1.73	1.40	1.73	1.40	0.77	0.93	0.33	0.20	0.45
Yield	26.90	38.90	40.80	10.20	5.60	10.10	78.90	81.50	57.00	53.00	91.80	87.30	91.10	88.70	50.50	50.80	75.00	74.00	73.00
Crop Price	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
Total Crop Revenue	102.22	147.82	155.04	69.16	21.28	38.38	299.82	309.70	216.60	201.40	348.84	331.74	346.18	306.66	191.90	193.04	285.00	281.20	277.40
Margin A: Revenue - TC	-5.27	45.09	63.56	-39.83	-85.44	-36.95	202.59	212.68	54.87	31.54	302.25	179.25	189.78	159.24	83.66	86.15	49.32	47.33	19.64
Margin B: Revenue - MA	40.42	86.02	93.24	6.36	-41.52	-24.42	235.92	245.80	134.34	101.14	348.84	221.06	235.50	195.98	126.95	128.09	103.08	99.28	95.48
Margin C: Revenue - (MA + LC)	29.62	76.02	88.54	-7.64	-55.42	-29.12	225.02	235.60	118.74	88.94	331.54	207.06	218.20	181.98	119.25	121.79	98.08	95.98	90.98

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced-till, 3-no till), and year

COMPARISON OF PRODUCTION COSTS
FOR WHEAT I-2000 PARTICIPANTS, 1986 89
USING TRADE-IN PRICE FOR MACHINERY
(Dollars per Acre)

	WHEAT FIELDS									
	20	21	22	23	24	25	26	27	28	29
	2-89	3-89	2-88	3-88	1-86	3-86	1-88	3-88	2-88	3-88
Operations Costs:										
Cost of Fall Operations	12.25	5.00	6.71	1.00	5.40	2.49	55.97	1.11	3.00	0.00
Cost of Spring Operations	20.41	12.52	14.24	25.00	7.00	15.68	10.41	10.41	22.07	20.87
Cost of Harvest Operations	30.76	30.70	37.15	30.07	35.62	36.60	36.53	36.20	37.15	36.77
Total Costs of Operations	71.42	56.22	58.10	64.15	48.02	54.77	102.92	47.72	62.23	57.64
- Fuel Costs	0.31	0.00	0.00	0.73	0.00	0.48	1.40	0.32	0.22	0.00
- Labour Costs (LC)	3.50	1.70	0.50	0.50	6.40	6.00	10.40	3.70	4.70	3.40
Material Costs:										
Seed	34.75	34.75	38.90	38.89	46.09	46.09	19.54	19.54	38.41	38.41
Fertilizer	73.64	73.64	39.79	39.79	119.97	120.43	20.98	20.98	46.27	46.27
Herbicide	7.41	25.41	2.26	2.27	0.00	0.00	31.40	31.40	4.20	4.20
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Material Costs (MA)	115.80	133.80	80.95	80.95	166.06	166.52	79.92	79.92	88.88	88.88
Total Costs (TC)	187.22	190.02	139.05	145.10	214.08	221.29	182.84	127.64	143.11	138.52
Total Hours	0.35	0.17	0.05	0.05	0.64	0.60	1.04	0.37	0.47	0.34
Yield	61.50	62.90	62.50	60.10	65.00	71.00	40.00	38.00	42.40	42.00
Crop Price	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80	3.80
Total Crop Revenue	233.70	239.02	237.50	250.70	247.00	269.80	152.00	144.40	161.12	162.64
Margin A: Revenue - TC	46.48	49.00	98.45	113.60	32.92	48.51	-30.84	16.76	18.01	24.12
Margin B: Revenue - MA	117.90	105.22	156.55	177.03	80.94	103.20	72.08	64.48	80.24	81.76
Margin C: Revenue - (MA + LC)	114.40	103.52	148.05	169.33	74.54	97.20	53.68	60.78	75.54	78.36

NOTES:
Under each field number is the tillage type (1-conventional, 2-reduced-till, 3-no till), and year